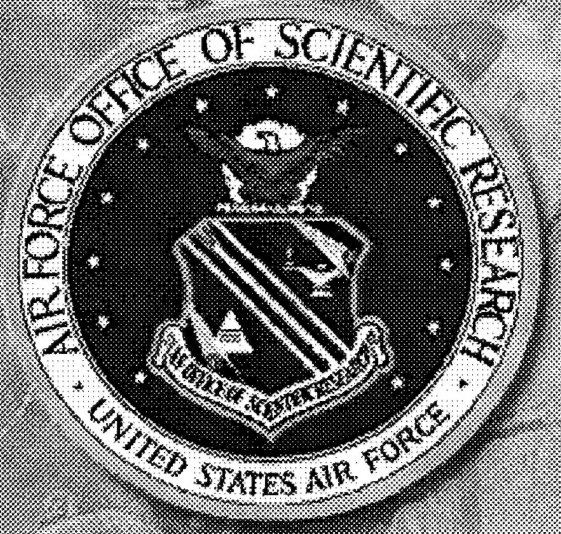
AFOSR

FY 97 Technology Transitions/Transfers

December 1998



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ABOUT THIS DOCUMENT

This document lists 352 transitions from Air Force-sponsored basic research programs to applications in the U.S. Air Force, in U.S. industry, and in other defense or nondefense government organizations. Only transitions reported during fiscal year 1997 are listed; transitions reported in prior years are not repeated in this report. Prior year reports are available on the AFOSR web site at http://www.afosr.af.mil.

All reported transitions are the result of basic research funded by AFOSR; this research in many cases is still ongoing. In most cases, the research was initiated between 10 and 15 years ago, and in a few cases, decades ago.

This document reports current transitions as contrasted to the customary historical reporting as to how research laid the foundations for current technology and products. We used the following to define "current transitions:"

A technology transition or transfer is a partnership between basic researchers and users where both expend nontrivial and sufficient resources toward realizing a product, process, or analytical objective.

Every entry must meet the requirement that both the supplier and the customer be named and the entry be described as both a research achievement and a customer benefit. The page columns feature detailed entries representing:

Subarea = numerical designator of the lowest level budgetary breakdown of AFOSR's programs
Title = name of the subarea
PM = name of responsible AFOSR program manager
Performer = name and organization of the AFOSR funded researcher
Customer = name and organization of the customer
Result = description of the research result(s)
Application = description of the use and/or application objective

The summary table of the 352 transitions/transfers on page iii provides data grouped in three categories:

a. The category labeled "Performer" summarizes the entries by the performers of research, i.e., by the sectors to which those we sponsor belong. For example, the fifth entry on Page 1 lists as a performer "Garscadden, AFRL" and, thus, counts as a transition from an Air Force laboratory, whereas eighth entry on the same page, performer George Caryotakis, Stanford University, counts as a transition from a university grantee. Note that 31 percent of AFOSR's funds goes to intramural research in Air Force laboratories, 64 percent goes to

university researchers, and the balance goes to researchers working in industry or other government laboratories.

b. The category labeled "Customers" summarizes the transitions to users. AFOSR's major customer sectors are the downstream exploratory and advanced development (6.2 and 6.3A) programs in the Air Force laboratories, industrial customers, and customers in other Air Force or governmental organizations. For example, on Page 2, the fifth entry lists a 6.2 customer "Dr Jon Porter, AFRL/MN" whereas the last entry is a customer in another governmental organization, "Navy, NSWC, Bill Blake", and on Page 3, the third entry is an industrial customer "Lockheed Martin/Denver".

Often, the industrial customer is sponsored by 6.2 or 6.3A funds from Air Force research laboratories, DARPA, or another Service, or works under contract with DOD acquisition organizations.

c. The category labeled "Application" captures the three principal application objectives: products, processes, and other technology benefits (e.g. data codes, software, etc.). Examples are as follows: the first entry on Page 3 is a process application "...that will lead to higher performance and longer life engines", the eighth entry on the same page is a product application "detect can lining defects and predict performance..." and, the fourth entry on Page 8 belongs in the "other benefits" category "reconfigurable flight control for C-17 transport aircraft...".

Original signed by:

Robert L. Herklotz, Col, USAF
Deputy Director

1997 BASIC RESEARCH TRANSITIONS

Major Basic Research Transitions to Application:		352
Performers:	AF Laboratories	89
	U.S. Industry	23
	Academia	240
Customers*:	AF 6.2/6.3A Programs	74
	U.S. Industry	238
	Other Air Force & U.S. Gov't	72
Application:	Product (new or improved)	119
	Process (new or improved)	203
	Other Technology Benefit	30

*Sums of categories exceed fiscal year total due to more than one customer per transition.

Subarea	Title	PM	Performer	Customer	Result	Military Utility
2301A	Photonic Physics	Schlossberg	Dr Attwood, University of California at Berkeley, (510) 486-4463	Extreme Ultraviolet (EUV) lithography consortium, Richard Freeman, (510) 422-6152	EUV lithography testing	High density, advanced microelectronics
2301A	Photonic Physics	Schlossberg	Dr Richard Osgood, Columbia University, (212) 854-4482	AFRL, WPAFB OH, Dr Antonio Crespo, (937) 255-7310	Integrated optics design and simulation	Advanced optical design for C3I
2301A	Photonic Physics	Schlossberg	Dr Harold Fetterman, UCLA, (310) 825-3431	TRW, John Brock, (310) 812-0087	Optically controlled radar concepts	High resolution radar for identification and targeting
2301D	Atomic & Molecular Physics	Kelley	Dr Will Happer, Princeton University (609) 258-4382	Magnetic Imaging Technologies, Inc., (MITI), Bastiaam Driehuys, (919) 572-0954	Laser-polarized gases for in-vivo magnetic resonance imaging. Patent Number 5,545,396	Non destructive evaluation of ceramic turbine parts
2301D	Atomic & Molecular Physics	Kelley	Dr A. Garscadden, Air Force Research Laboratory (AFRL), WPAFB OH, (937) 255-2248 and J. Clark, J. Wrbanek, Wright State University	SEMATECH, Dr Greg Hebner, (505) 844-6831	Drift velocities and attachment coefficients for CHF3	Production of high density electronics for satellite applications
2301D	Atomic & Molecular Physics	Kelley	Dr R. Wu, K Systems, (937) 255-2923	NASA Lewis, Dr K. Miyoshi; WL/POOC (6.2), Ms Sandra Fries-Carr, (937) 255-6016	Low friction, large area diamond-like-carbon (DLC) coatings with oxygen and nitrogen doping. High resistivity DLC films	Solid lubricants for aeronautical and space applications. High temperature, high voltage capacitors
2301D	Atomic & Molecular Physics	Kelley	Drs D. Schweickart and A. Garscadden, AFRL, WPAFB OH, (937) 255-2246	AFRL, WPAFB OH, More Electric Initiative, Dr Dan Schweickart, (937) 255-9189	Signal processing for statistics of insulation degradation and breakdown	270 v connector studies, G. Hoads, J. Horwath, L. Walko, Establish standards for 270 v aircraft power systems
2301E	Plasma Physics	Barker	Dr George Caryotakis, Stanford University, (415) 926-4446	Dr Kyle Hendricks, AFRL, Phillips Research Site, (505) 846-9852	Proven capabilities for ultraclean high vacuum technology	Higher energy microwave weapons
2301E	Plasma Physics	Barker	Prof Victor Granatstein, University of Maryland, (301) 405-5404	Dr Robert Parker, Naval Research Laboratory, (202) 767-6656	Transitioned innovative technique for High Power Microwave (HPM) ceramic sintering	New Navy medium-power microwave source system
2301E	Plasma Physics	Barker	Dr Robert J. Vidmar, SRI International, (650) 859-6190	Canada Intertech, Dr Jaque Bridges, (514) 257-3451	Transitioned innovative technique of pressurized microchannel cooling	Overcome insurmountable localized cooling problems in military integrated circuits
2302B	Mechanics of Materials	Ochoa	Dr F.G. Yuan, North Carolina State University, (919) 515-5665	Drs N. Pagano & R. Kim, AFRL Materials Directorate, (937) 255-6762	Models for fracture processes of brittle matrix composites	Provided design allowable for brittle fracture in ceramic compsoites
2302B	Mechanics of Materials	Ochoa	Dr A. Kaw, University of South Florida, (813) 974-5626	Drs N. Pagano & G. Tandon, AFRL Materials Directorate, (937) 255-6762	Indentation tests will be used in computational models	Enabled separation of damage mechanisms to address failure modes
2302B	Mechanics of Materials	Ochoa	Dr G. Newaz, Wayne State University, (313) 577-3677	General Electric-CRD and GE Aircraft Engines, (513) 243-8334	Thermal barrier coating damage initiation and growth studies	Software-thermal wave imaging to assess coating durability after in-service use
2302B	Mechanics of Materials	Ochoa	Dr G. Newaz, Wayne State University, (313) 577-3677	Research Applications Inc, (619) 259-75441	SBIR proposal submitted to Army	Software Design Tool for Oxidation and Thermal Barrier Coatings
2302B	Mechanics of Materials	Ochoa	Dr K. Reifsnider, Virginia Polytech Institute (PI) and State University (SU), (540) 231-5316	Dr T. Gates, NASA Langley-HSCT Program, (757) 864-8911	Life modeling of K3B composites	HSR version of MRLife simulation code, manual, and training

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2302B	Mechanics of Materials	Ochoa	Dr K. Reifsnider, Virginia PI & SU, (540) 231-5316	United Tech, Dr. Karl Prewo, (860) 727-7237, Pratt Whitney, Dr. Ron Cairo, (561) 796-40056 Goodyear, Dr. Ahmet Talug, (303) 796-7633, Johnson & Johnson, Dr. Arindam Datta (908) 218-3265	Users of Life Prediction Code MRLife developed at Virginia Polytec Institute	Customized MRLife code to address demonstration projects, manual, and training
2302C	Particulate Mechanics	Chipley	Prof Hasset, SUNY, (315) 470-6827	Dr Tom Stauffer, AFRL/ML, (904) 283-6059	The photodegradation mechanisms for Quadracyclane were theoretically predicted and experimentally determined	Toxic fuel compound degradation for environmental compliance
2302C	Particulate Mechanics	Chipley	Prof Chisolm-Braus, William and Mary, (804) 642-7029	Dr Tom Stauffer, AFRL/ML, (904) 283-6059	The mineral complexes of iron oxides able to bind chlorinated solvents in the subsurface have been isolated and identified	Retardation and destruction of toxic chlorinated solvents for environmental compliance
2302C	Particulate Mechanics	Chipley	Prof Znidarcic and Prof Hernandez, University of Colorado, (303) 492-7577	Dr Tom Stauffer, AFRL/ML, (904) 283-6059	The toxic compound additives of deicer fluids used for AF deicing operations have been identified (triazols) and new cultures of microbes capable of degrading deicing fluids in the subsurface or in surface waters have been grown in chemostat conditions	AF flying operations have been curtailed in many locations due to massive fish kills or exceeding pollution discharge limits of deicing fluids. The microbes offer a potential landfarming technique to naturally degrade the toxic materials
2302C	Particulate Mechanics	Chipley	Prof Ju, UCLA, (310) 206-1751	Dr Jon Porter, AFRL/ML, (904) 283-3073	The combined thermo-mechanical loadings on concrete have been theoretically coupled allowing for build-up of steam and pore water pressures responsible for the spalling effect caused by jet engine or Auxiliary Power Unit (APU) exhaust	Predictive tool to determine the life expectancy of concrete runways
2302C	Particulate Mechanics	Chipley	Prof Ahrens, CALTECH, (818) 395-6906	Dr Dave Jerome, AFRL/MN, (904) 882-9643 ext 242	The damage accumulation caused by shock waves propagating through geomaterials has been theoretically coupled to the penetration event of rigid projectiles	Deep Target Attack Weapon
2302C	Particulate Mechanics	Chipley	Prof Zhou, Georgia Tech, (404) 894-3294	Dr Dave Jerome, AFRL/MN, (904) 882-9643 ext 242	The measurement of high strain rates loads applied to geomaterials has been accomplished using a Velocity Interferometer for Any Reflector (VISAR) system coupled to a high speed gas gun	Maximize the penetration depth of deep penetrator weapon
2302D	Structural Mechanics	Sanders	Dr Ali Nayfeh, Virginia Tech, (540) 231-5453	Cessna Aircraft Co, John Axtell, (316) 941-6000	Computer code coupling nonlinear unsteady aerodynamics, structural dynamics, and control systems	Predict on-set of flutter, post flutter behavior, and active flutter control
2302D	Structural Mechanics	Sanders	Dr Ali Nayfeh, Virginia Tech, (540) 231-5453	Wolfram Research, Cetin Cetinkaya, (217) 398-0700	Mathematical based software to solve (approx) an arbitrary set of non-linear differential equations	Structural dynamics, power systems, ships, submarines, and aircraft
2302D	Structural Mechanics	Sanders	Dr Michael Howe, Boston University, (617) 353-5869	Navy, NSWC, Bill Blake, (301) 227-1879	Methodologies for Predicting Vibration Damping of Perforated Elastic Plates	Sound and vibration problems of ships and submarines

Subarea	Title	PM	Performer	Customer	Result	Military Utility
2302D	Structural Mechanics	Sanders	Dr Earl Dowell, Duke University, (919) 660-5389	AFRL, Mark Hopkins, (513) 255-7384, Pratt & Whitney, Gary Hilbert, (860) 565-5422	Reduced Order Modeling Methodologies for Aerodynamic Models	Aeroelastic analysis and design of highly flexible aircraft structures such as High Altitude, Long Endurance Uninhabited Air Vehicles and fan blades for gas turbine engines that will lead to higher performance and longer life engines
2302D	Structural Mechanics	Sanders	Dr Tinsley Oden, Computational Mechanics Company, Inc, (512) 467-0618	NASA, Veloria Martinson, (512) 467-0618 Goodyear, Dr Michael Trinko, (330) 796-1722	Friction Model has been incorporated into TIRE3D/TCAN computer code	Structural analysis of nonlinear deformations for designing and predicting replacement intervals of all fighter, bomber, and transport aircraft tires
2302D	Structural Mechanics	Sanders	Dr John Junkins, Texas A&M, (409) 845-3947	Lockheed Martin/Denver, Tom Depkovitch, (303) 977-9584	Dynamic and Control Methodology for fine pointing of flexible structures	Precision pointing of all space based communication, sensing, and weapons platforms
2303B	Surface Science	De Long	Dr Steve Sibener, University of Chicago (312) 702-7193	Dr Linda Young, Argonne National Laboratory, (630) 252-8878	Technology for generating supersonic molecular beams	They serve as intense sources of cooled atoms for atomic physics
2303B	Surface Science	De Long	Dr Jeffrey Zabinski, WL/MLBT, (513) 255-8544	Frank Manders, Honeywell, (602) 561-4161	Nanocrystalline composite TiC/Diamond Like Carbon (DLC) and multilayer DLC/Ti	Coatings to improve the life and performance of control moment gyros for spacecraft
2303B	Surface Science	De Long	Dr Charles M. Lieber, Harvard University, (617) 496-3169	Michael N. Gardos, Hughes Aircraft Co., (310) 616-9890	Fundamental understanding of tribology at nanometer scale	Development of space based lubricants
2303B	Surface Science	De Long	Dr Michael N. Gardos, Hughes Aircraft Co., (310) 616-9890	JPL/CALTECH/Hughes Tri-party Technical Co-operative Agreement, Michael N. Gardos, (310) 616-9890	Tribology of diamond as a Micro Electro Mechanical Systems (MEMS) construction and bearing material	Develop diamond microgyros to replace element bearing-based stabilized gyroscopes on satellites - longer life
2303B	Surface Science	De Long	Dr S. Ray Taylor, University of Virginia (804) 982-5788	Jack Powers, Ball Corporation, (303) 4600-5075; Jack Snodgrass, Reynolds Metals, (804) 751-2358/2583; Thomas Mallen, Valpar Corporation, (412) 734-8582; Ravi Rajaand Alain LeTalludec, American National Can/Pechiney, (314) 957-9528; Susan Jones and Vito Biundo, Metal Container Corp./Anheuser Busch, (314) 577-2962	Local Electrochemical Impedance Spectroscopy	To examine painted aluminum surfaces for coatings defects for aging aircraft. To detect can lining defects and predict performance as a function of food or beverage chemistry
2303B	Surface Science	De Long	Dr S. Ray Taylor, University of Virginia (804) 982-5788	Geoff Walters, BHP Steel-Australia, 08-9328-4475	Local Electrochemical Impedance Spectroscopy	Examining coated steel for corrosion evaluation/inspection for conditioned based maintenance
2303B	Surface Science	De Long	Dr Daniel Nocera, MIT, (617) 253-5537	Manooch Koochesfahani, Michigan State University, (517) 355-5311	Designed a cyclodextrin based alcohol imaging system	Used for the measurement of velocimetry flow fields to quantify the flow at the leading edge of airfoils for high performance aircraft

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2303B	Surface Science	De Long	Dr Daniel Nocera, MIT, (617) 253-5537	Larry Goss, Innovative Scientific Solutions Inc., (937) 252-2706; Kevin Kilpatrick, AEDC; Gary Dale, AFRL/FIMO; Doug Rabe, AFRL/POTX; Jim Gord AFRL/POSF	Designed and supplied inorganic luminescent active sites that are pressure sensitive	Incorporate into polymer matrix to develop pressure sensitive paints for Air Force testing program
2303B	Surface Science	De Long	Dr Steve Pearton, University of Florida, (352) 846-1086	Jay Sasserath, PlasmaTherm, Inc., (813) 577-4999	In-situ plasma cleaning process for preventing corrosion on etched magnetic films	Used for next generation high density hard drives for computers-C3I
2303B	Surface Science	De Long	Dr Steve Pearton, University of Florida, (352) 846-1086	Randy Shul, Sandia National Labs, (505) 844-6126	Patterning process for LaCaMnO3 thin films	Useful for ultra-high sensitivity recording and magnetic sensing-C3I
2303B	Surface Science	De Long	Dr Steve Pearton, University of Florida, (352) 846-1086	Dave Johnson, PlasmaTherm, Inc., (813) 577-4999	New etching chemistry for NiFe thin films at sub-micron dimensions	Useful for high density recording and magnetic sensing-C3I
2303B	Surface Science	De Long	Dr Jeff Childress, University of Florida, (352) 846-1090	Dieter Weller, IBM, (408) 927-2067	Method for deposition of NiMnSb thin films at low temperatures	Electroluminescent flat panel display arrays for laptops-C3I
2303B	Surface Science	De Long	Dr Jeff Childress, University of Florida, (352) 846-1090	F. Petroff, CNRS, France, (1) 69339065	Deposition of multilayer structures with Nb superconducting buffers	Magnetoresistive sensors for detecting any magnetic fields for object and device detection-Intel
2303B	Surface Science	De Long	Dr F. Sharifi, University of Florida, (352) 846-1086	Al Hurst, Honeywell, Inc., (612) 954-2492	Process for high density Magnetic Random Access Memory (MRAM) on Si and SiN membranes	High density, non-volatile data storage systems for missile and submarine permanent memory storage
2303B	Surface Science	De Long	Dr F. Sharifi, University of Florida, (352) 846-1086	M. Paalannen, Helsinki University of Technology, (011) 358-441601	Tunnel devices on Collossal Magnetoresistive films	Ultra-high sensitivity magnetic sensors for detecting any magnetic field for object and device detection-Intel
2303B	Surface Science	De Long	Dr K. G. Eyink, AFRL, WPAFB OH, (937) 255-6316	Paul Colombo, EPI, Inc., (612) 365-0488	Improvements for optical sensing and control of temperature for Molecular Beam Epitaxy (MBE) effusion cells	Improved Molecular Beam Epitaxy (MBE) source cells and high temperature evaporation for use in magnetron sputterers for improved spare parts coating
2303B	Surface Science	De Long	Dr K. G. Eyink, AFRL, WPAFB OH, (937) 255-6316	Steve Adams, TA&T, (937) 255-7878	Improved Molecular Beam Epitaxy (MBE) computer control system utilizing feedback control of spectroscopic ellipsometric sensing for materials growth	Advanced sensor based Molecular Beam Epitaxy (MBE) growth of electro-optic films for electronic device applications for improved reliability in weapons system electronics
2303B	Surface Science	De Long	Dr K. G. Eyink, AFRL, WPAFB OH, (937) 255-6316	K. Evans, Quantum Epitaxial Devices, (610) 861-6930 x225	Growth of epitaxial III-V antimonides for magnetoresistive (MR) sensors	Advanced, low power sensors for detecting magnetic fields for object and device detection-Intel
2303B	Surface Science	De Long	Dr Joseph Lichtenhan, AFRL, Phillips Research Site, (805) 275-5749	Klaus Dahl, Raychem Corp., (415) 361-3070	Polyhedral Oligomeric Silsesquioxane (POSS) monomer technology	Used for wiring insulation and interconnects with improved thermal stability and mechanical properties to extend their life reducing lifecycle costs
2303B	Surface Science	De Long	Dr Joseph Lichtenhan, AFRL, Phillips Research Site, (805) 275-5749	Ed Ellis, Bausch & Lomb, (716) 338-5768	POSS monomer technology	Use as nanoreinforcing agents in their lines of rigid gas permeable and soft contact lenses improving their lifecycle

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2303B	Surface Science	De Long	Dr Joseph Lichtenhan, AFRL, Phillips Research Site, (805) 275-5749	Don Giedt, United Technologies, (408) 776-4234	POSS monomer technology	Use as thermally stable, erosion resistant insulations and composite resins for insulation for rocket motor nozzles
2303C	Polymer Chemistry	Lee	Dr Ray Chen, Microelectronics Research Center, University of Texas, Austin, (512) 471-8575	Gemfire, Joseph Chon, (415) 813-9000,	Liquid-contact-poled electrooptic polymer based waveguides and modulators	Guided wave optical interconnects for flat panel displays
2303C	Polymer Chemistry	Lee	Dr Ray Chen, Microelectronics Research Center, University of Texas, Austin, (512) 471-8575	Radiant Research, Suning Tang, (512) 388-4670, MCC, Chad Nodding, (512) 338-3769,	Single-mode and multi-mode waveguides	Analog and digital data links for high bandwidth network communications
2303C	Polymer Chemistry	Lee	Dr Ray Chen, Microelectronics Research Center, University of Texas, Austin, (512) 471-8575	GE, Yung Liu, (518) 387-6436	Thick electrode formation	Phased array antenna linear modulator for Phase Array Radar Control
2303C	Polymer Chemistry	Lee	Dr Larry Dalton, University of Southern California, (213) 740-8768	Gemfire Corporation/Deacon Research, Dr William K. Bischel/Dr Hilary Lackritz, (415) 493-6100	Second Order Nonlinear Optical Materials	Fabrication of large area flat panel displays
2303C	Polymer Chemistry	Lee	Dr Larry Dalton, University of Southern California, (213) 740-8768	RVM Scientific, Robert V. Mustacich, (805) 964-3368	Photochromic Second Order Nonlinear Optical Materials	Evaluation of multicolor photolithographic processing of integrated waveguide circuits
2303C	Polymer Chemistry	Lee	Dr Larry Dalton, University of Southern California, (213) 740-8768	Tacan Corporation/Ipitek, Dr James H. Bechtel, Dr Yongquiang Shi, (760) 438-1010	Second Order Nonlinear Optical Materials	Fabrication and testing of prototype electro-optic modulator devices for fiber optics networks in C4I
2303C	Polymer Chemistry	Lee	Dr Larry Dalton, University of Southern California, (213) 740-8768	Pacific Wave Industries, Inc., Dr Joseph Michael, (310) 209-0777	Second Order Nonlinear Optical Materials	Fabrication and evaluation of prototype broadband electro-optic modulator devices for Microwave Radar Control
2303C	Polymer Chemistry	Lee	Dr Larry Dalton, University of Southern California, (213) 740-8768	Hughes Research Laboratories, Dr Uzi Efron, (310) 317-5000	Photochromic and Electro-Optic Materials	Fabrication and evaluation of prototype devices for communications
2303C	Polymer Chemistry	Lee	Dr Art Epstein, Ohio State University, (614) 292-1133	License by The Ohio State University to American company under polymer triode architecture	Provisional patent on corrosion protection of aluminum	Corrosion protection of aluminum
2303C	Polymer Chemistry	Lee	Dr Alan Heeger, Institute for Polymers and Organic Solids, University of California at Santa Barbara, (805) 893-3184	BMDO, Alexander Gilmore, SMDC-TC-AC, (205) 955-1568; DARPA, Dennis Healy, (703) 696-0143,dheahy@darpa.mil; UNIAX, Dr N. Colaneri, (805) 562-9293 ncolaneri@uniax.com	Dr J. McElvain completed his thesis research under support from this AFOSR	Agile spatial filter for enhanced target detection
2303C	Polymer Chemistry	Lee	Dr Frank Karasz, University of Mass. at Amherst, (413)-545-4783	M. Chipalkatti, Osram/Sylvania, (508) 740-3459	Polymer light emitting diodes	For electroluminescent display panels and large area light high efficiency sources in cockpits and command centers

Subarea	Title	PM	Performer	Customer	Result	Military Utility
2303C	Polymer Chemistry	Lee	Dr Frank Karasz, University of Mass. at Amherst, (413)-545-4783	S. Humphrey, Elf-Aquitaine, (610) 337-6587	Polyvinylidene fluoride blends	For extended use in ultraviolet resistant coatings, structural materials, for space and aircraft
2303C	Polymer Chemistry	Lee	Dr Frank Karasz, University of Mass. at Amherst, (413)-545-4783	R. Gagne, Maxdem, Inc., (909) 394-0644	Substituted polyphenylenes polymer structures for mechanical applications	For very high strength and modulus structural polymers: "self-reinforcing composites" for air and space vehicles
2303C	Polymer Chemistry	Lee	Dr Frank Karasz, University of Mass. at Amherst, (413)-545-4783	P. Schuler, Triton Systems, Inc., (508) 250-4200	Polybenzimidazole containing phosphates blended with other polymers	A satellite coating material to prevent atomic oxygen attack in space environments
2303C	Polymer Chemistry	Lee	Dr John Kenney, Lightwave Microsystems Corporation, (415) 322-1534	Dr Edward Binkley, Lightwave Microsystems Corporation, (408) 748-6263	Polymer Electro-Optic Devices and Foundry	For developing materials, processes, and designs for Add/Drop Wavelength Division Multiplexer (WDM) devices for communication networks
2303C	Polymer Chemistry	Lee	Dr Doug Mackenzie, University of California at Los Angeles, (310) 825-3539	MicroTouch Systems, Inc., Dr C-Y Lee, (508) 659-9000	Semiconductor Quantum Dots	Optical switch device for network communications in C3I
2303C	Polymer Chemistry	Lee	Dr Doug Mackenzie, University of California at Los Angeles, (310) 825-3539	Aura Systems, Inc., Dr Ken Chen, (310) 643-5300	Semiconductor Quantum Dots	Room temperature optical waveguide switches for C4I applications
2303C	Polymer Chemistry	Lee	Dr Doug Mackenzie, University of California at Los Angeles, (310) 825-3539	DARPA, Dr William S. Coblenz, (703) 696-2288	Semiconductor Quantum Dots	Use of ferroelectric semiconductor quantum dots for optical delay devices for C4I applications
2303C	Polymer Chemistry	Lee	Dr Seth Marder, California Institute of Technology, (818) 395-2829	University of Arizona, Bernard Kippelen, (520) 621-4341, and Nasser Peyghambarian	Chromophores for photorefractive polymers	Materials for optical signal processing, holography and imaging in C4I
2303C	Polymer Chemistry	Lee	Dr Seth Marder, California Institute of Technology, (818) 395-2829	University of Southern California, Larry Dalton, (213) 740-8768	Substituted triphenylamino donors with either aldehyde or bromide functionality	Materials for high speed electro-optic modulators at telecommunication wavelengths for communication networks
2303C	Polymer Chemistry	Lee	Dr Seth Marder, California Institute of Technology, (818) 395-2829	Northeastern University, Alex Jen, (617) 3737-5151	Thermally stable, highly nonlinear chromophores for electro-optic applications	Materials for high speed electro-optic modulators at telecommunication wavelengths for communication networks
2303C	Polymer Chemistry	Lee	Dr Seth Marder, California Institute of Technology, (818) 395-2829	Lockheed-Martin Corporation, Susan Ermer, (415) 424-3131	Thermally stable, highly nonlinear chromophores for electro-optic applications	Materials for high speed electro-optic modulators in spacecraft
2303C	Polymer Chemistry	Lee	Dr Seth Marder, California Institute of Technology, (818) 395-2829	Wright Laboratory, Captain Mike Derosa, (937) 255-3808.	Various phthalocyanine and naphthalocyanine compounds	Materials for optical limiting applications to protect eyes and sensors from damage due to intense laser pulses
2303C	Polymer Chemistry	Lee	Dr Jim Mark, University of Cincinnati, (513) 556-9292	Drs F. E. Arnold and M. R. Unroe, Wright Patterson Air Force Base, (937) 255-9160	Toughened high-temperature polymers	Structural materials in aircraft, and toughened, higher-melting transparent polymers for aircraft canopies
2303C	Polymer Chemistry	Lee	Dr W.E. Moerner, University of California at San Diego, (619) 822-0453	Dr Chuck Woods, RL/EROP, Hanscom AFB, 617-377-4922	Photorefractive polymer sample and Indium Tin Oxide plate source	Testing and evaluation for possible optical gain applications, limiting, and phase conjugation for C4I

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2303C	Polymer Chemistry	Lee	Dr W.E. Moerner, University of California at San Diego, (619) 822-0453	Dr Fassil Gebremichael, HQ USAFA/DFP, (719) 333-2483	Photorefractive polymer sample and Indium Tin Oxide plate source	Testing and evaluation in laboratory experiments on optical gain applications, limiting, and/or phase conjugation for C4I
2303C	Polymer Chemistry	Lee	Dr John Reynolds, Florida University, (352) 392-9151	Dr Dan McLean, AFRL, WPAFB OH, (937) 255-3808 (x3121)	Polyurethane materials containing metal bis(dithiolene) transition metal complexes prepared by the Reynolds Group for testing as possible optical limiting materials	Optical Limiters for sensor and pilot protection
2303C	Polymer Chemistry	Lee	Dr John Reynolds, Florida University, (352) 392-9151	Dr Stephen Carracci, AFRL, WPAFB OH, (937) 255-4474 (x3216)	Information on highly transmissive conducting polymer solutions based on PEDOT that are commercially available	Transparent Conductors for high speed modulators in RF optical control in Phased Array Radar
2303C	Polymer Chemistry	Lee	Dr John Reynolds, Florida University, (352) 392-9151	Dr Bruce Reinhardt, AFRL, (937) 255-9162	Synthesized oxidatively polymerizable fluorene containing Bis(EDOT) based monomers	Redox Switchable Fluorene Containing Polymers for advanced display system
2303C	Polymer Chemistry	Lee	Dr John Reynolds, Florida University, (352) 392-9151	Mr Walter Melnick, AFRL, (850) 882-9583	Technical reports and papers on electrochromic polymers in consideration for ultimate application to dialed-tint windows	Dialed-Tint canopy for fighter aircraft
2303C	Polymer Chemistry	Lee	Dr Dan Sandman, University of Massachusetts at Lowell, (508) 934-3835	Dr Thomas Cooper and Dr Lalgudi Natarajan, AFRL, (937) 255-3808 (Ext3104)	Molecular and polymeric materials	For developing materials for sensor protection in the near IR and visible ranges
2303C	Polymer Chemistry	Lee	Dr Charles Spangler, Montana State University, (406) 994-4801	Laser Photonics Technology, Inc., Martin Casstevens; (716) 688-8251 and the Laser Hardening Group (MLPJ) at Wright Labs (Dr Natarajan), (937) 255-3808 (extn.3104)	Six organic compounds as new potential optical power limiters	For development and testing as sensor and eye protection in the visible range
2303C	Polymer Chemistry	Lee	Dr W. Steier, University of Southern California, (213) 740-4415	TACAN, Inc., Dr Y. Shi, (619) 438-1010 (x3219)	Fabrication technology for polymer waveguide electro-optic modulators	Commercial applications in Cable TV and fiber optic networks in C4I
2303C	Polymer Chemistry	Lee	Dr W. Steier, University of Southern California, (213) 740-4415	SRICO, Inc., Dr Sri Sriram (614) 799-0664	Polymer electro-optic technology	Devices for missile guidance systems
2303C	Polymer Chemistry	Lee	Dr W. Steier, University of Southern California, (213) 740-4415	Deacon Research, Dr William Bischel, (415) 493-6100	Waveguide fabrication and measurement technology	Company confidential approach to 2D displays, potentially useful for machine-human interfaces
2303C	Polymer Chemistry	Lee	Dr Mrinal Thakur, Auburn University, (334) 844-3324	Dr Steve Caracci, AFRL, WPAFB OH, (937) 255-4474	Single crystal films of NPP, COANP and DAST	Thin film modulator for C4I applications
2303C	Polymer Chemistry	Lee	Dr Mrinal Thakur, Auburn University, (334) 844-3324	Dr Steve Caracci, AFRL, (937) 255-4474 and Optivision Inc., Dr R.A. Hill, (415) 855-0200	Single crystal films of NPP, COANP and DAST	In-line fiber modulator using single crystal film for C4I applications
2303C	Polymer Chemistry	Lee	Dr Mrinal Thakur, Auburn University, (334) 844-3324	Femtochrome Inc., Dr Zafer Yafa, (510) 644-1869	Single crystal films of NPP, COANP and DAST	Autocorrelator for C4I applications
2303C	Polymer Chemistry	Lee	Dr S.T. Wu, Hughes Research Labs, (310) 317-5901	Raytheon Company, Terry Dorschner, (617) 860-3071	New liquid crystal mixtures	Laser beam steering using optical phased arrays developed at Raytheon Company
2303C	Polymer Chemistry	Lee	Dr S.T. Wu, Hughes Research Labs, (310) 317-5901	Macro-Vision Communications, Jen-Yu Liu, (303) 939-0027	New liquid crystal mixtures	Fiber-optic communications developed at Macro-Vision Communications

Subarea	Title	PM	Performer	Customer	Result	Military Utility
2304A	Dynamics and control	Jacobs	Prof G. Balas, University of Minn., (612) 625-6857	NAWC, Patuxent River, MD, Chris Mullaney, (301) 342-7720	New linear parameter varying control design and analysis technology and software based on convex programming methods	Power-approach lateral-directional flight control law for F-14
2304A	Dynamics and control	Jacobs	Prof R. Murray, Caltech, (626) 395-6460	Boeing North America, Daniel Hill, (714) 762-1151	New multivariable robust control design and analysis techniques and software	High performance control of an electrostatic gyro - inertial guidance sensor marketed by Boeing
2304A	Dynamics and control	Jacobs	Prof T. Kailath & C. Schaper, Stanford, (650) 723-3688	CVC Inc., Fremont, CA, Yong Jin Lee, (510) 770-9200	New decentralized control algorithms leading to simple directionality-based controllers for general multizone uniformity problems	Installation on single-wafer rapid thermal chemical vapor deposition and rapid thermal processing reactors for CVC, a relatively new semiconductor and disk-drive equipment supplier - their first system, including this decentralized controller was delivered to Sharp in July 1997 for titanium silicide deposition for use in advanced Avionics Systems
2304A	Dynamics and control	Jacobs	Prof M. Bodson, University of Utah, (801) 581-8590	NASA Dryden, Joel Sitz, (805) 258-3666; Boeing, Jim Urnes, (314) 234-3775	New recursive algorithms for the real-time identification of aircraft dynamic parameters	Reconfigurable flight control for C-17 transport aircraft (Intelligent Damage Control System Initiative); Simulator tests proposed for 1998; Tentative flight tests approx. 2002
2304A	Dynamics and control	Jacobs	Prof J. Speyer, UCLA, (310) 206-4451	Boeing, Jerry Miller, (562) 797-1977	Decentralized controllers and string stability for tight formation flight	High altitude, solar powered, formation enhanced, aerial vehicle systems
2304A	Dynamics and control	Jacobs	Profs T. Kailath, C. Schaper and Mr K El-Awady Stanford, (650) 723-3688	Applied Materials, Santa Clara, CA, H. Talieh, (408) 563-4710	New integrated approach to modeling & simulation, multivariable control, optimization, signal processing, and system identification techniques focused microlithographic processes led to compelling understanding that unacceptable transient temperature gradients could be eliminated by novel way of integrating the bake/chill steps	New Technology: Integrated Bake/Chill Module - Photo resist processing on silicon wafers and flat panel displays for advanced micro lithography for use in advanced Avionics Systems
2304A	Dynamics and control	Jacobs	Profs T. Kailath, C. Schaper and Mr K El-Awady Stanford, (650) 723-3688	IBM, Burlington, VT, Janet Rocque, (802) 769-1023	New integrated approach to modeling & simulation, multivariable control, optimization, signal processing, and system identification techniques focused microlithographic processes led to compelling understanding that unacceptable transient temperature gradients could be eliminated by novel way of integrating the bake/chill steps	New Technology: Integrated Bake/Chill Module - Photo resist processing on mask membranes used for x-ray lithography for use in advanced Avionics Systems
2304A	Dynamics and control	Jacobs	Profs T. Kailath, C. Schaper and Mr K. El-Awady Stanford, (650) 723-3688	IBM, Burlington, VT, Bob Hornstrom and Peter Buck, (503) 526-7259	New integrated approach to modeling & simulation, multivariable control, optimization, signal processing, and system identification techniques focused microlithographic processes led to compelling understanding that unacceptable transient temperature gradients could be eliminated by novel way of integrating the bake/chill steps	New Technology: Integrated Bake/Chill Module - Photo resist processing on quartz reticles used as optical masks for microlithography for use in advanced Avionics Systems

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2304A	Dynamics and control	Jacobs	Prof M. Safonov, University of Southern California, (213) 740-4455	Spectrum Astro, Inc., Manhattan Beach, CA, Stan Dubyn, (310) 643-9303	New multiplier algorithm for robustness analysis enables reliable analysis of tolerance to mixed real and complex parameter variations in complex multi-loop feedback control systems	Theory implemented in MATLAB software facilitated fast and reliable design of complex pointing and sluing maneuver control system for a very large next-generation commercial communication satellite being developed jointly by Spectrum Astro and Hughes Aircraft Space and Communications Systems Division with partial support from NASA
2304A	Dynamics and control	Jacobs	Dr Stephen Keeling, Sverdrup Technology, Inc., (615)-454-4833	Sverdrup Technology, Inc Advanced Missile Signature Center, Kathy L. Dietz, (615) 454-4833	A new capability for reconstructing images in the presence of noise and shocks using a minimal residual approach with total variation regularization	Result provides a deconvolution capability for the analysis of rocket plumes
2304A	Dynamics and control	Jacobs	Dr Stephen Keeling, Sverdrup Technology, Inc., (615) 454-4833	Sverdrup Technology, Inc., Systems Eng. & Reliability Branch, Mike L. Mills, (615) 454-6736	A new polytope-based aerodynamic optimal design capability especially suited for nozzle design problems	Design capability will be used in the facility upgrade project for improving flow quality in AEDC wind tunnels 16S, 16T, and 4T
2304A	Dynamics and control	Jacobs	Dr J. Lumley, et al, Cornell University, (607) 255-4050	Beam Technologies, Inc., Gal Berkooz, (607) 273-4367 ext 223	New reduced order modeling and control strategies for aerodynamic flow	Beam Technologies is integrating the low dimensional modeling technology into its commercial computational Partial Differential Equation (PDE) substrate - PDESolve for use in the control of aerodynamic flows to improved aeroengine performance, improved lift/drag in course flight, etc.
2304A	Dynamics and control	Jacobs	Drs R. Murray and B. Shapiro, Caltech, (626) 395-6460	United Technologies, Research Center, G. Rey, (860) 610-7510	New analysis methods for the effects of mistuning stiffness and mass of individual fan blades on the stability boundary (flutter) and forced response properties of the compressor	Technique is currently being applied to UTRC's 17" fan rig - if successful, the results will have numerous applications to military and commercial engines
2304A	Dynamics and control	Jacobs	Dr Kevin Wise, Boeing, St Louis, MO, (314) 232-4549	NASA Ames, Intelligent Flight Control, Charles Jorgensen, (415) 604-6725	New nonconservative robustness analysis tools capable of accurately determining flight control sensitivity to knowing the aerodynamic coefficients	Reconfigurable flight control program; Aerodynamic coefficients measured in real-time; control law gains calculated in real-time; tools used to evaluate control law stability robustness
2304A	Dynamics and control	Jacobs	Dr Kevin Wise, Boeing, St Louis, MO, (314) 232-4549	NASA Ames, X-36 Program, Rodney Bailey, (415) 604-6726	New nonconservative robustness analysis tools capable of accurately determining flight control sensitivity to knowing the aerodynamic coefficients	X-36 program—Tailless fighter agility program; aircraft is open loop unstable in pitch and yaw; tools used to evaluate how sensitive the control laws are to aerodynamic coefficients
2304B	Physical Mathematics and Applied Analysis	Nachman	Dr Norman Malmuth, Rockwell Science Ctr., Box 1085, Thousand Oaks, CA 91358 (805) 373-4154	Major B.L. Indermill, Applied Technology Division Test Operations Directorate AEDC, DSN 340-6513	Provided engineering analysis code for rapidly assessing wall interference effects during transonic test conditions	The transonic speed (.7<M<1) regime is where the AF wishes to release stores but where the wind tunnel wall effects are the hardest to predict
2304B	Physical Mathematics and Applied Analysis	Nachman	Dr Greg Forest, Mathematics, University of North Carolina, Chapel Hill NC 27599, (919) 962-9606	KC Giese, Hoechst-Celanese Corp., PO Box 32414, Charlotte NC 28232, (704) 554-2000	Derived a model (and its numerical implementation) of spin line processing during the molten form of the production	Simulation of new production processes for product variants such as cargo nets and aircraft jump seats requested by the AF

Subarea	Title	PM	Performer	Customer	Result	Military Utility
2304C	Computational Mathematics	Schreck	Prof John Burns, Virginia Polytechnic Institute and State University, (540) 231-7667	Dr Andrew Godfrey, AeroSoft Inc., (540) 231-6125	Software package based on sensitivity equation optimization method efficiently computes sensitivities to small changes in design parameters	Allows fast, efficient optimization of complex flow problems, requires only existing fluid flow solutions, and can be flexibly configured by inexperienced users. Design tool for a range of design problems involving chemically reacting flows, e.g. scramjet design
2304C	Computational Mathematics	Schreck	Prof John Burns, Virginia Polytechnic Institute and State University, (540) 231-7667	Dr Fritz Roetman, Boeing Defense and Space Group, (206) 662-0063	Advanced grid models enable use of sensitivity equation method software to be used to improve accuracy of surrogate models	Application of sensitivity approach improves quality of aerodynamic performance estimates provided by Boeing 3DOpt for aircraft configurations for improved aircraft performance
2304C	Computational Mathematics	Schreck	Dr Gal Berkooz, Beam Technologies, (607) 273-4367	Mr Mike Love, Lockheed Martin Tactical Aircraft Systems, (817) 777-2141	Beam flow sensitivity equation optimization module was integrated into ASTROS structural analysis code	Modified code provides accurate and efficient aeroelastic tailoring optimization and flutter prediction in the transonic regime. Reduce fatigue in aircraft wings and turbine blades
2304C	Computational Mathematics	Schreck	Dr Gal Berkooz, Beam Technologies, (607) 273-4367	Dr Dipankar Choudhury, Fluent, (603) 643-2600	Beam flow sensitivity equation optimization module was incorporated into Fluent RAMPANT fluid flow code	Modified code provides accurate and efficient optimization for complex fluid flow problems, including aircraft aerodynamics
2304C	Computational Mathematics	Schreck	Dr Bob Peterkin, AFRL Directed Energy Directorate, (505) 846-0259	Dr Harold Gerrish, NASA Marshall, (205) 961-1474	MACH3 code provides accurate, fast computations of magnetohydrodynamics using parallel, coupled, implicit, three-dimensional algorithm	MACH3 code used to investigate advanced non-chemical propulsion concepts for future satellites and space vehicles
2304C	Computational Mathematics	Schreck	Dr Bob Peterkin, AFRL Directed Energy Directorate, (505) 846-0259	Dr Leo Rahal, Geo-Centers Inc., (505) 243-3483	MACH3 code provides accurate, fast computations of magnetohydrodynamics using parallel, coupled, implicit, three-dimensional algorithm	MACH3 code used to investigate magnetoplasmadynamic thruster concepts for future satellites and space vehicles
2304C	Computational Mathematics	Schreck	Dr Bob Peterkin, AFRL Directed Energy Directorate, (505) 846-0259	Dr Ying-Ming Lee, MSE Technology Applications, (406) 494-7100	MACH3 code provides accurate, fast computations of magnetohydrodynamics using parallel, coupled, implicit, three-dimensional algorithm	MACH3 code used to investigate magnetic nozzle designs for plasma propulsion concepts for future satellites and space vehicles
2304C	Computational Mathematics	Schreck	Dr Bob Peterkin, AFRL Directed Energy Directorate, (505) 846-0259	Dr M. Arman, AFRL, Directed Energy Directorate, (505) 846-5524	Icepic code provides accurate, fast and stable particle-in-cell computations using a parallel algorithm and Cartesian meshing	Icepic code used to design and analyze narrowband microwave sources for radio frequency weapons
2304C	Computational Mathematics	Schreck	Prof George Karniadakis, Brown University, (401) 863-1217	Dr John Ekaterinaris, Nielsen Engineering and Research, (415) 968-9457	NEKTAR code provides accurate, efficient high order computational flow solutions on highly distorted unstructured meshes	NEKTAR code obtained to model compressible, three-dimensional flow fields and acoustics for air vehicles
2304C	Computational Mathematics	Schreck	Prof George Karniadakis, Brown University, (401) 863-1217	Dr John Drake, Oak Ridge National Lab, (423) 574-8670	NEKTAR code provides accurate, efficient high order computational flow solutions on highly distorted unstructured meshes	NEKTAR code obtained to perform high order characterization of ocean currents

Subarea	Title	PM	Performer	Customer	Result	Military Utility
2304C	Computational Mathematics	Schreck	Prof Marsha Berger, Courant Institute of Mathematical Sciences, (212) 998-3305	Mr Mike Aftosmis, NASA Ames Research Center, (415) 604-4499	Adaptively refined Cartesian grids give fast discretization and accurate solutions for computational fluid dynamics on complex external aircraft geometries	Adaptively refined Cartesian grids allows rapid gridding and fast, accurate solution of Euler equations in support of NASA High Wing Transport/C-17 alternative flap design wind tunnel test
2304C	Computational Mathematics	Schreck	Prof Marsha Berger, Courant Institute of Mathematical Sciences, (212) 998-3305	Dr Bill van Dalsem, NASA Ames Research Center, (415) 604-4469	Adaptively refined Cartesian grids give fast discretization and accurate solutions for computational fluid dynamics on complex external aircraft geometries	Adaptively refined Cartesian grid methodology chosen for NASA Aeronautical Design Test Environment/Facility Environment Simulation Tools (ADTE/FEST), an integrated design and test environment for numerical and experimental tests
2304C	Computational Mathematics	Schreck	Prof Barna Szabo, Washington University, (314) 935-6352	Dr Scott Fields, Boeing, (314) 234-0032	P-version finite element method specialized to model nonlinear material and geometric aspects of structural joints and fittings	Specialized finite element method enables accurate modeling of cold-worked holes and attachment lugs in aircraft structures
2304C	Computational Mathematics	Schreck	Prof Antony Jameson, Stanford University, (415) 725-6208	Dr John Vassberg, Boeing, (562) 593-9604	Optimization algorithm based on adjoint method allows efficient, robust optimization of aircraft aerodynamics	Reduced drag for future aircraft
2304C	Computational Mathematics	Schreck	Prof David Gottlieb, Brown University, (401) 863-2266	Dr Tom Jackson, AFRL Propulsion Directorate, (937) 255-9991	Spectral code gives accurate, efficient, stable solutions for compressible, reacting Navier-Stokes equations	Code accurately and efficiently models reactive flows and resolves physical details of mixing/combustion in combustor, facilitating design and analysis
2304D	Optimizations & Discrete Mathematics	Glassman	Prof Aubrey Poore, Colorado State University, (970) 491-6695	Boeing Company, Frank Gorecki, Boeing Defense & Space Group, (206) 773-6370	New data association algorithms that perform real-time, automatic, multitarget tracking	Possible use in multitarget, multisensor applications such as the F22, B1 and B2, and NATO AWACS fusion problems
2304D	Optimizations & Discrete Mathematics	Glassman	Prof Zafer Gurdal Virginia Polytechnic Institute, (540) 231-5905	Sikorsky Aircraft, Christos Kassapoglou, (203) 386-3292	An analysis code which is sufficiently efficient to be used with a genetic algorithm for design and optimization of grid stiffened panels for minimum mass and fabrication cost	The code has been installed at Sikorsky Aircraft and has been used to design minimum mass and minimum cost helicopter tub panels using Sikorsky's models
2304D	Optimizations & Discrete Mathematics	Glassman	Prof Raphael Haftka, University of Florida, (352) 392-9595	McDonnell Douglas Aerospace, Dr George Tzong, (310) 497-5050	Response surface methodology was developed for creating a differentiable approximation to lower level optima as a function of top level design variables in bi-level optimization	Has been used by McDonnell Douglas to study the design of narrow body transports using MDC's Aerolastic Design Optimization Program
2304D	Optimizations & Discrete Mathematics	Glassman	Prof Gerald Brown Navy Postgraduate School (408) 656-2140	Col Ed Crowder, AFSystems Analysis Agency, (703) 6977--5679	Brown has developed new modeling techniques which incorporate "persistence," the requirement that decision makers be able to control the extent to which model results are consistent with previous decisions	This technique is central to the evolution of the Enhanced Strike Model. This model is being evaluated to replace HEAVY ATTACK, which the AF uses to analyze procurement of conventional weapons
2304D	Optimizations & Discrete Mathematics	Glassman	Dr Adel Chemaly, TechnoSoft Inc., (513) 989-9877	Air Force Research Laboratory Air Vehicles Directorate, Dr Max Blair, (937) 255-6435	Development of an object-based modeling language for integrated product and process design, analysis and simulation	The integration of design and production planning will result in lower cost and better performance for weapons systems

Subarea	Title	PM	Performer	Customer	Result	Military Utility
2304D	Optimizations & Discrete Mathematics	Glassman	Dr Adel Chemaly, TechnoSoft Inc., (513) 989-9877	Lockheed Martin, Mr Hal Jennings, (817) 777-0950	Development of an object-based modeling language for integrated product and process design, analysis and simulation	This framework was used as the underlying framework for the integrated development of the mechanical and optical design for an interactive gimbal for aircraft threat/detection systems. The integration of the structural and optical design enabled a 10-fold reduction in design cycles
2304E	Signals, Communication and Surveillance	Sjogren	Dr Timothy Schulz, Michigan Tech. Univ. (906) 487-2754	Dr David Voelz, AFRL, (505) 846-5162	Coherent array imaging estimation techniques	Ground-based surveillance of space objects by means of high-power laser illumination
2304E	Signals, Communication and Surveillance	Sjogren	Dr Timothy Schulz, Michigan Tech. Univ. (906) 487-2754	Capt Bruce Stribling, AF Maui Optical Station, (808) 891-1808	Numerical enhancements in blind deconvolution	Surveillance of space-based objects using conventional telescopes
2304E	Signals, Communication and Surveillance	Sjogren	Dr Arye Nehorai, Univ. of Illinois at Chicago, (312) 996-2778	Dr Phillip Valent, Dr David Young, NRL Stennis Center (601) 688-4650	Chemical sensor arrays for vapor detection	Environmental monitoring of disposal sites
2304E	Signals, Communication and Surveillance	Sjogren	Dr Arye Nehorai, Univ. of Illinois at Chicago, (312) 996-2778	Cmdr J. Polcari, Undersea Warfare Center, (703) 604-6013 ext 527	Methods for locating sources by means of velocity sensors	High accuracy acoustic source location (target) using a small hull-mounted acoustic sensor array
2304E	Signals, Communication and Surveillance	Sjogren	Dr R. Plemmons, Wake Forest University, (910) 759-5358	Dr Brent Ellerbroek, Starfire Optical Range, (505) 846-4712 ext 229	Closed-loop adaptive control methods	Mirror-shaping mechanisms for deblurred visualization of space-based objects
2304E	Signals, Communication and Surveillance	Sjogren	Dr A. Shaw, Wright State Univ., (513) 873 5064	Dr Rob Williams, (937) 255-6329	High Range Resolution data characterization through correlation analysis	New algorithms are able to classify targets at 99% accuracy using Xpatch simulated data, with few false alarms for real-world MSTARS data
2304F	Reliable Software for Critical Systems	Hendler	Dr Christian, UCSD, (619) 822-0424	Jon Dehn (Lockheed) Federal Aviation Administration (301) 640-2912	Fault tolerant services	Techniques being used in design of FAA's Display Replacement System (DSR)
2304F	Reliable Software for Critical Systems	Hendler	Dr Henziger, University of California at Berkeley, (510) 643-2430	Howard Wong-toi, Cadence Design Systems, Military and Commercial Users, (501) 647-2829	HyTech, a tool for the analysis of hybrid systems	HyTech provides a tool for the analysis of real-time critical systems such as surveillance systems, weapons control systems, and aircraft/spacecraft control systems
2304F	Reliable Software for Critical Systems	Hendler	Dr Zhao, Texas A&M University, (409) 845-5098	Rakesh Tha, Honeywell, (612) 951-7320	The NetEx communication manager	NetEx will be used in Honeywell's RTARM system for real-time resource management in mission-critical control applications
2304G	Artificial Intelligence	Waksman	Dr James Crawford, University of Oregon, (503) 346-0473	Dr Stan Cross, McDonnell Douglas, (503) 346-0473	New class of algorithms for scheduling and planning	New scheduling algorithms developed for lower cost manufacture of aircraft; adopted by McDonnell Douglas.
2304G	Artificial Intelligence	Waksman	Mr Vince Velten, AFRL, (513) 255-1115	Mr Joe Sacksteder, National Air Intelligence Center (NAIC)/PINPOINT Project, (937) 257-7847	New class of algorithms for infrared (IR) recognition	Advanced intelligent precision munitions
2304G	Artificial Intelligence	Waksman	Prof Nandhakumar, University of Virginia, (804) 924-6108	Mr D. Gerson, CIA/ORD RADIUS Program, (703) 351-2727	New class of thermal and physical invariants for recognition	Advanced Tracking Radar (ATR) systems

Subarea	Title	PM	Performer	Customer	Result	Military Utility
2304I	Electromagnetics	Nachman	Dr Oscar Bruno, Applied Mathematics, Cal Tech, Pasadena CA 91125, (818) 395-4548	Maria Caponi, Ocean Tech Dept, TRW One Space Park, Redondo Beach CA 90278, (310) 812-0079	Provided a new, superior code for the prediction of EM wave scattering from rough surfaces such as the ocean or terrain	The AF is interested in assessing the contribution of ground and canopy clutter to the radar return from possible targets
2304I	Electromagnetics	Nachman	Dr Jeff Herd, AFRL, 31 Grenier St., Hanscom AFB MA 01731, (617) 377-8904	J. Freeman, Phased Array Manager, Boeing Defense & Space Grp, Seattle WA 98124, (206) 393-8850	Analyzed the EM output of a microstrip patch antenna array and codified the result	The AF is interested in designing phased array antennas for a variety of uses including target acquisition
2305B	Electromagnetic Devices	Witt	Dr Anwar Webster, AFRL/SNH, (781) 377-3683	Lockheed/Sanders, Dr John Heaton, (603) 885-1054	Devised a technique to determine the conduction and valence band alignments in semiconductor heterstructures	Design of high frequency microwave electronic systems
2305B	Electromagnetic Devices	Witt	Dr Derov Crisman, AFRL/SNH, (781) 377-2638	NZ Technologies, Dr Jim Daly, (908) 247-7336	Measured energy band shifts in GaN, AlGaN materials; developed optical coatings and capping layers	Phased array radar
2305B	Electromagnetic Devices	Witt	Dr Chris Bozada, AFRL/SNDD, (937) 255-7394	Mpulse Microwave, G. Coonce, (408) 432-14800	Devised a thermal-shunt Heterojunction Bipolar Transistor (HBT) fabrication technique	Phased array radar
2305B	Electromagnetic Devices	Witt	Dr Chris Bozada, AFRL/SNDD, (937) 255-7394	Spire Corp., S. Vernon, (617) 275-6000	Developed carbon doping for applications to GaAs HBTs	Communication radar
2305B	Electromagnetic Devices	Witt	Dr Chris Bozada, AFRL/SNDD, (937) 255-7394	Gateway Modeling, Inc., Dr R. Anholt, (612) 339-4239	Designed advanced High Electron Mobility Transistor (HEMT) and HBT processing techniques	Fabrication of DoD electronic warfare circuits
2305B	Electromagnetic Devices	Witt	Dr James Gillespie, AFRL/SNDD, (937) 255-7394	UES, Inc., Dr R. Bhattacharya, (573) 426-6700	Developed an advanced implant isolation process for HBTs	Used in wireless communication and radar systems
2305B	Electromagnetic Devices	Witt	Dr James Gillespie, AFRL/SNDD, (937) 255-7394	Penn State University, Prof Theresa Mayer, (814) 865-5446	Developed and fabricated AlGaAs HBTs	Used in power transistor applications
2305B	Electromagnetic Devices	Witt	Dr Tom Jenkins, AFRL/SNDD, (937) 255-7394	UCSB, Dr U. Mishra, UIUC, Prof. H. Miorkoc, NRL, K. Christianson, (805) 893-3586	Developed and executed advanced power and noise measurement techniques	Applications to power transistor and mixed signal circuit technologies for space surveillance
2305B	Electromagnetic Devices	Witt	Dr Ken Nakano, AFRL/SNDD, (937) 255-7394	TRW, Inc., Dr Dwight Steit, (310) 814-1722	Developed HBT with improved performance and reliability	Thermal-shunt HBTs for various DoD electronic systems
2305B	Electromagnetic Devices	Witt	Dr Tony Quach, AFRL/SNDD, (937) 255-7394	Vendelin Engineering, Dr G. Vendelin, (408) 867-2291	Developed a high power HBT-Microwave Monolithic Integrated Circuit (MMIC) oscillator	Used in wireless communications
2305B	Electromagnetic Devices	Witt	Dr James Sewell, AFRL/SNDD, (937) 255-7394	Northrop/Grumman, ESSD, Dr B. Bayraktoroglu, (410) 765-2947	Perfected a thermal-shunt HBT fabrication technology	Used in wireless communication and radar systems
2305B	Electromagnetic Devices	Witt	Dr David Via, AFRL/SNDD, (937) 255-7394	Dr Andy Slobodnik, AFRL/SNH, (781) 377-3716	Produced a 60 GHz phase shifter	To be used in satellite-to-satellite communications
2305B	Electromagnetic Devices	Witt	Prof U. Mishra, University of California at Santa Barbara, (805) 893-3586	HRL, Malibu, CA, Dr D. Grider, (310) 317-5007	Developed an effective Metal Organic Chemical Vapor Deposition (MOCVD)-grown buffer layer and overgrowth technology for GaN/AlGaN heterostructures	Used to produce high power microwave devices and circuits
2305B	Electromagnetic Devices	Witt	Prof E. Weber, University of California at Berkeley, (510) 642-0205	Motorola Corp., Dr John Abrokwah, (937) 255-3625	Developed a Beryllium-doped and stabilized form of non-stoichiometric GaAs	To be used in low power, radiation-hardened electronic circuits

Subarea	Title	PM	Performer	Customer	Result	Military Utility
2305B	Electromagnetic Devices	Witt	Prof E. Weber, University of California at Berkeley, (510) 642-0206	Q.E.D. Corp., Dr Keith Evans, (610) 861-6930	Developed a Beryllium-doped and stabilized form of non-stoichiometric GaAs	To be used in low power, radiation-hardened electronic circuits and for other products
2305B	Electromagnetic Devices	Witt	Prof U. Mishra, University of California at Santa Barbara, (805) 893-3586	AFRL/MLPO, Dr Matt Siefert, (937) 255-4474	Developed a conformal substrate utilizing buried Al-oxide layers	To be used in the development of IR sensor and circuits
2305B	Electromagnetic Devices	Witt	Dr John Whitaker, University of Michigan, (313) 763-1324	Motorola Corp. Laboratory, Dr John Abrokwah, (937) 255-3625; NPS, Prof. T. Weatherford, (408) 656-3044	Developed a lifetime measurement technique and applied same to materials for radiation hardening	To be used in radiation-hardened communication satellites
2305B	Electromagnetic Devices	Witt	Dr John Whitaker, University of Michigan, (313) 763-1324	Picometrix, Inc., Dr Steve Williamson, (313) 998-4503	Invented and produced a photoconductive-sampling probe based on non-stoichiometric GaAs	Testing of high-capacity space communications
2305B	Electromagnetic Devices	Witt	Dr John Whitaker, University of Michigan, (313) 763-1324	HRL, Malibu, CA, Dr P. Greiling, (310) 317-5321	Invented and produced a photoconductive-sampling probe based on non-stoichiometric GaAs	Used to fabricate and validate radiation-hardened satellite circuits
2305C	Novel Electronic Components	Witt	Prof A. Gossard, Univ. of California at Santa Barbara, (805) 893-2686	Spire Corp., Dr K. Linden, (617) 275-6000	Designed and modeled graded semiconductor structures for Molecular Beam Epitaxy (MBE) growth	Advanced avionic electronic circuitry
2305C	Novel Electronic Components	Witt	Prof A. Gossard, Univ. of California at Santa Barbara, (805) 893-2686	Filmetrics, Dr S. Chalmers, (619) 554-0005	Developed technique using in-situ atomic absorption and reflectivity for monitoring of molecular beam fluxes	Radiation-hard space electronics
2305C	Novel Electronic Components	Witt	Prof P. Bhattacharya, Univ. of Michigan, (313) 763-6678	IBM, Dr B. Myerson, (914) 945 3000	Developed a buffer layer for use in Ge-on-Si that eliminates defects	Advanced avionic electronic circuitry
2305D	Optoelectronic Information Processing	Craig	Dr Demetri Psaltis, Electrical Engineering, Caltech, Pasadena, CA (626) 395-4843	Dr Fai Mok, Holoplex, 600 S. Lake, Pasadena, CA 91106, (818) 793-9616	Spatial shift multiplexing for holographic disks	Holographic memories in biometrics (fingerprint recognition), gesture recognition (arcade game), and automatic target recognition (DoD/MICOM)
2305D	Optoelectronic Information Processing	Craig	Prof Larry Coldren, ECE Dept., UCSB, Santa Barbara, CA 93106, (805) 893-4486	Dr Frank Peters, Gore Photonics, 425 Commerce Court, Lompoc, CA 93436, (805) 737-7391	Tapered apertures for reduced losses in vertical-cavity surface-emitting lasers	VCSELs support efficient, high-bandwidth optical data links in airplanes and in free-space interconnections for high-speed processors
2305D	Optoelectronic Information Processing	Craig	Dr Dennis Deppe, ECE Dept., University of Texas at Austin, Austin, TX 78759, (512) 471-4960	Dr Jack Jewell, Picolight, Inc., 4622 Sunshine Canyon, Boulder, CO 80302, (303) 546-0567	Impurity implant and anneal process for control of oxide aperture in AlGaAs/GaAs VCSEL	Manufacture of highly uniform, low threshold VCSEL arrays for optical interconnects in computers and processors. Circumvents limiting electronic technology in computational performance important for various functions from scheduling, to target recognition, to remote visualization
2305D	Optoelectronic Information Processing	Craig	Dr Rufus Cone, Physics Department, Montana State University, Bozemen, MT 59717, (503) 382-0976	Dr Ralph Hutcheson, Scientific Materials Corp., 310 Icepond Road, PO Box 786, Bozeman, MT (406) 585-3772	Er3+ in Y2SiO5, Y2O3, and LiNbO3 at 1550 nm; Tm3+ in YAG, YLuAG, and LuAG for 790 nm (high bandwidth I/O)	Erbium doped materials support all-optical data routing using time domain correlative characteristic on distributed, multi-processor computational systems being developed for remote, real-time visualization to provide battlefield simulation

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2305D	Optoelectronic Information Processing	Craig	Dr Rufus Cone, Physics Department, Montana State University, Bozemen, MT 59717, (503) 382-0976	Dr Ralph Hutcheson, Scientific Materials Corp., 310 Icepond Road, PO Box 786, Bozeman, MT (406) 585-3772	Pr3+:Y2SiO5 and Eu3+:Y2SiO5 optimized for ODRAM project at Templex Technologies	Thulium doped YAG: best material to date for persistent spectral hole burning optical memory. Supports optical DRAM for image buffering and processing at high bandwidth and in field-parallel formats
2305D	Optoelectronic Information Processing	Craig	Dr Fouad Kiamilev, Electrical Eng. Dept, UNC Charlotte, NC 28223, (704) 547-3345	Dr Richard Oettel, Duet Technologies (formerly Cascade Design Automation), (206) 643-0200; Dr A. Krishnamoorthy, MTS, Bell Laboratories, Lucent Technologies, Holmdel, NJ (732) 949-1847	Automated placement and routing of CMOS-SEED silicon circuitry using EPOCH tools. Lucent purchased the tools for use in R&D programs. Leading tool developer at UNCC (Mr. Richard Rozier) will join Lucent to help this transition	This technology promotes router performance and provides high I/O speed for communication buffer memory, essential attributes for data coordination in distributed computation systems planned for image data fusion to provide real-time battlefield visualization
2305D	Optoelectronic Information Processing	Craig	Dr Fouad Kiamilev, Electrical Eng. Dept, UNC Charlotte, NC 28223, (704) 547-3345	Dr Tom Hausken, Project Coordinator, Optoelectronics Industry Development Association, Washington, DC 200336, (202) 785-4426	Designed 10 channel VCSEL driver CMOS IC with built-in self-test and on-chip clock generation circuitry	Prototype ICs fabricated free to US researchers to demonstrate optoelectronic systems based on VCSEL technology. Optoelectronic interconnects will accelerate data transfer in computing systems for various C4I applications, e.g. image processing and real-time visualization
2305D	Optoelectronic Information Processing	Craig	Dr Julian Cheng, University of New Mexico, Center for High Technology Materials, 1313 Goddard SE, Albuquerque, NM 87106, (505) 272-7846	Dr Frederick Lin, Physical Optics Corp, Applied Technology Div, 2545 W.237th Street, Suite B, Torrance, CA 90505, (310) 530-1416	Oxide-confined VCSELs with non-uniform quantum wells and sub-milliampere threshold current for a very wide cw operating temperature range (4 K to 420 K)	High-efficiency and very low-power-dissipation cryogenic VCSEL arrays for high-speed (multi-Gb/s) optical read-out of infrared image data from a cryogenic focal plane array to the external electronic signal processors. These focal plane arrays capture infrared imagery for surveillance
2305D	Optoelectronic Information Processing	Craig	Dr Julian Cheng, University of New Mexico, Center for High Technology Materials, 1313 Goddard SE, Albuquerque, NM 87106, (505) 272-7846	Dr Ken Hahn, Hewlett Packard Lab, 3500 Deer Creek Road, Palo Alto, CA 94303, (415) 857-2872	Proton-implant-isolated, monolithic, inverted-junction VCSEL arrays grown on p-GaAs substrates	These VCSEL arrays will drive data on parallel channel optical fiber backplanes in high performance computers suitable for image processing and visualization
2305D	Optoelectronic Information Processing	Craig	Dr Richard Paxman, ERIM, P.O. Box 134001, Ann Arbor, MI 48113-4001, (313) 994-1200	Dr Robert Fugate, Starfire Optical Range, AFRL Kirtland AFB, NM 87117	Developed fast computational algorithm for phase diversity image reconstruction in the presence of pupil plane turbulence aberrations	Bayesian algorithm for phase-diverse wavefront sensing reduces aberration correction time at Starfire Optical Range
2305E	Semiconductor Materials	Prairie	Prof Stephen Forrest, Dept of Electrical Engineering, Princeton University, Princeton, NJ, (609) 258-4532	Janice K. Mahon, Universal Display Corporation, Princeton, NJ, (610) 617-4010	Developed multicolor, Transparent, Organic Light-Emitting Device (TOLED) using organic molecular-beam deposition in vacuum	Cockpit instrumentation displays. (Automotive version introduced by Pioneer Electronics in 1997)
2305E	Semiconductor Materials	Prairie	Drs M. Mier, D. Look, AFRL, WPAFB, OH (937) 255-1725	James J. Barry, Creare, Inc., Hanover, NH, (603) 643-3800	Infrared spectral identification of dislocations in GaAs:Si wafers (Patent)	High-efficiency satellite solar panels
2305E	Semiconductor Materials	Prairie	Dr J. van Nostrand, AFRL, WPAFB, OH, (937) 255-2227 X3389	Dr A Schultz, Iron Works, Inc., Houston, TX, (713) 522-9880	Development and testing procedures for nitrogen ion source used in MBE growth diagnostics	Growth of p-AlGaN for ultraviolet detectors. Enables solid-state, solar-blind missile warning system

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2305E	Semiconductor Materials	Prairie	Dr Ed Stutz, AFRL, WPAFB, OH, (937) 255-2227 X3498	Dr Peter Chow, SVT Assoc., Eden Prairie, MN, (612) 941-1898	Development of a carbon-doping source for molecular-beam epitaxy	IR detector for missile warning systems
2305E	Semiconductor Materials	Prairie	Drs J. Ehret, J. van Nostrand, AFRL, WPAFB, OH, (937) 255-2227 X3389	Dr Peter Chow, SVT Assoc., Eden Prairie, MN, (612) 941-1898	Developed Smart Linear-Motion Oven for source flux control in molecular-beam epitaxy	Precise control of quantum-well profiles in broad range of GaN-based devices. Solar-blind ultraviolet missile warning
2305F	Electromagnetic Materials	Prairie	Dr Kedar Gupta, GT Equipment Technologies, Inc., Nashua, NH, (603) 883-5200	Dr David Bliss, AFRL/SNHX, Hanscom AFB, MA, (617) 377-4841	High-pressure, magnetically-stabilized, liquid-encapsulated Czochralski growth reactor for InP: Industrial prototype	Optical fiber based, light-weight, on-board sensors and data networks for aircraft and satellites; high-performance microwave/RF transmitters for communication links and countermeasures
2305F	Electromagnetic Materials	Prairie	Dr Kevin Malloy, University of NM, Albuquerque, NM, (505) 272-7855	Major Greg Vansuch, AFRL/DELS, Kirtland AFB, NM (505) 846-5786	Digital alloys for infrared semiconductors previously unattainable due to immiscibility	Infrared semiconductor lasers for infrared countermeasures and spectroscopic sensing of chemical agents
2305F	Electromagnetic Materials	Prairie	Dr Ravi Pandy, MI Tech Univ., Houghton, (906) 487-2831	Mel Ohmer, AFRL/MLPO, Wright-Patt AFB, OH (937) 255-4474, Ext 3233	Defect energies for ZnGeP2 were determined; Zn vacancy identified as probable defect limiting NLO performance.	Non-linear-optical (NLO) systems for generating infrared laser wavelengths for infrared countermeasures. Knowledge will be used to improve NLO crystals to usable level
2305F	Electromagnetic Materials	Prairie	Prof John Ekerdt, Dept. of Chemical Engineering, University of Texas, Austin, TX, (512) 471-4689	Leo Yau, Intel Corp., Hillsboro, OR, (503) 642-6679	Demonstrated enhanced performance in p-type SiGe MOSFETs (transistors) by engineering the strain and energy properties by adding carbon to the SiGe alloy	High-speed silicon-based integrated circuits for real-time information processing (Information Dominance)
2305G	Quantum Electronic Solids	Weinstock	Dr M.R. Beasley, Stanford University, (415) 723-1196	3M, Joseph Storer, (612) 733-6462	Tunable diode laser used in manufacturing process development	High Temperature Superconductor (HTS)+G197 tapes for magnets and cables in space power systems
2305G	Quantum Electronic Solids	Weinstock	Drs James H. Rose, John Moulder, Iowa State University, (515) 294-7537/9750	Sierra Matrix, Inc., John Carruthers, (510) 623-3690	Software and hardware module for eddy-current measurements of aircraft	Detection and characterization of corrosion in aircraft lap splices
2305G	Quantum Electronic Solids	Weinstock	Dr David D. Awschalom, University of California at Santa Barbara, (805) 893-2121	Digital Instruments, Inc., Ken Babcock, (805) 967-1400, Ext 277	Submicron current imaging technique using magnetic force microscopy	Inspection and characterization of buried conductors in integrated electronics to improve the performance and reliability of microelectronic systems
2305G	Quantum Electronic Solids	Weinstock	Dr David D. Awschalom, University of California at Santa Barbara, (805) 893-2121	Digital Instruments, Inc., Lucien Ghislein, (805) 967-1400, Ext288	Bent 100-nm near-field optical-fiber cantilevers for existing AFM instruments	Room-temperature scanning near-field optical imaging of integrated laser structures for optoelectronics for improved communications systems
2305G	Quantum Electronic Solids	Weinstock	Dr John Talvacchio, Northrop Grumman STC, (412) 256-1437	US Government and Northrop Grumman Electronic Sensors & Systems Div, H. Ball, (410) 765-0410	Six-mask-level integrated circuit process for first multilayer HTS digital circuits based on single-flux-quantum (SFQ) logic	20 Ghz-bandwidth digital receivers for higher data rate transmission and more secure communication

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2305G	Quantum Electronic Solids	Weinstock	Dr John Talvacchio, Northrop Grumman STC, (412) 256-1437	DARPA, F. Patten and Northrop Grumman Electronic Sensors & Systems Div, G. Bates, (410) 765-2535	Improved HTS films applied to filters switchable between low insertion loss and 50 dB isolation	More secure communications and electronic warfare application
2305G	Quantum Electronic Solids	Weinstock	Dr Roman Sobolewski, University of Rochester, (716) 275-1551	TRW, Jim Murduck, (310) 812-0115	Laser-processing technique for annealing step-edge YBCO Josephson junctions	Higher-quality YBCO Josephson junctions for high-temperature superconducting electronic circuits, yielding higher resolution radar systems
2306A	Structural Metallic Materials	Wu	Drs Sanford Asher and Fred Pettit, University of Pittsburgh, (412) 624-9730	David Moon, Westinghouse Science and Technology Center, (412) 256-2817	In-situ diagnostics system was developed (using ultraviolet Raman Spectroscopy) for growing thin films during CVD	Thermal barrier coatings for high temperature turbine blades (for non DoD applications Westinghouse: thin films on a microwave plasma reactor)
2306A	Structural Metallic Materials	Wu	Drs S.L. Semiatin and Dennis M. Dimiduk, AFRL, Materials and Manufacturing Directorate, (937) 255-9839/255-1345	Don Clemens, Pratt & Whitney, West Palm Beach, FL, (561) 796-6531	Fundamental knowledge on microstructure evolution and temperature transients during short-time heat treatment of TiAl was used to design a heat treatment process for TiAl hardware	High temperature cover plates, disks, etc. in jet engines
2306A	Structural Metallic Materials	Wu	Drs Tresa Polluck and Jack Beuth, Carnegie-Mellon University, (412) 268-2973	Curtiss Austin, GE Aircraft Engines, (513) 243-2114	Carefully tested data, aimed at investigating the effects of the limited ductility of gamma alloys on the components containing stress concentrators, was used for the final turbine blade design (by GE)	GE90 low pressure turbine blade
2306A	Structural Metallic Materials	Wu	Dr Dennis M. Dimiduk, S. Seshagiri, and J.P. Simmons, AFRL, Materials and Manufacturing Directorate, (937) 255-9839/255-1345	Patrick Martin, Rockwell International Science Center, Thousand Oaks, CA, 805-373-4274; Don Clemens, Pratt &Whitney, West Palm Beach, FL, (561) 796-6531	Fundamental knowledge of chemical (Mo and Cr) effects on microstructure evolution and transformation kinetics during lamellar formation in TiAl was used to modified alloy chemistries for processing scale-up of TiAl-based IHPTET hardware	High temperature cover plates, disks, airfoils, etc. in jet engines
2306A	Structural Metallic Materials	Wu	Dr Bernard Bewlay, Melvin Jackson and Lipsitt, GE-CRD, (518) 387-6121	Amit Chatterrjee, Allison, (317) 230-4435	Improved fracture toughness and creep properties of Nb-based silicide intermetallic composites determined in this effort (by adding new composition elements such as Hf and Ti) has resulted in their selection for IHPTET Phase III demonstration	Primary material for High Pressure Turbine (HPT) blades and back-up material for HPT vanes
2306A	Structural Metallic Materials	Wu	Dr Y-W Kim and Dennis M. Dimiduk, AFRL, Materials and Manufacturing Directorate, (937) 255-9839	Andy Rosenberger, AF Research Lab, Materials and Manufacturing Directorate, WPAFB, OH, (937) 255-3304	Fundamental mechanistic knowledge of deformation and fracture of TiAl, accumulated over the past seven years of 6.1 research, was used as basis for formulating 6.2 life-prediction methods strategic plan, and contract awarded to General Electric	All TiAl hardware, especially high temperature cover plates, disks, etc. in jet engines

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2306A	Structural Metallic Materials	Wu	Dr P.R. Subramanian, M.G. Mendiratta, M. Stucke, D.J. Evans and Dennis M. Dimiduk, AFRL, Materials and Manufacturing Directorate, (937) 255-9839	Mike Kinsella, AFRL, Propulsion Directorate, WPAFB, OH, (937) 255-6768	The fundamental mechanistic knowledge of behavior and alloy chemistries, accumulated over the past 12 years of 6.1 research, was used as basis for formulating 6.2 advanced turbine airfoil strategic plan under the IHPTET Phase-III PRDA-VI contract efforts	IHPTET turbine blades and vanes having >100°C temperature improvement
2306A	Structural Metallic Materials	Wu	Dr John Perepezko, University of Wisconsin, (608) 263-1678	Douglus Berczik, Pratt & Whitney, FL, (561) 796-6442	Fundamental knowledge on phase stability and microstructural stability of Mo-B-Si was used to develop (multiphase microstructures) strategic plan for an optimum system	High temperature cover plates, disks, airfoils, etc. in jet engines
2306A	Structural Metallic Materials	Wu	Dr David Davidson and Kwai Chan, Southwest Research Institute, (210) 522-2314	Donald Shih, Boeing/MD, St Louis, (314) 232-9202	The fundamental knowledge of fully lamellar microstructure, including crack-path tortuosity and interactions between the crack tip and the lamellar microstructure, in TiAl-based intermetallic alloys was led to the development of strengthening toughening mechanism for manufacturing superplastic forming and diffusion bonding of gamma-TiAl sheet	All TiAl hardware, especially high temperature airfoils, cover plates, etc.
2306B	Ceramic and Nonmetallic Materials	Pechenik	Dr Scott Barnett, Northwestern University, (847) 491-2447	Greenfield Industries, T. Muehlhans, (706) 650-4102	Nano-layered Nitride and Oxide Coatings show excellent properties in wear and cutting applications	Improving properties of high-speed cutting drills, extending life by decreasing wear and increasing temperature stability
2306B	Ceramic and Nonmetallic Materials	Pechenik	Dr Scott Barnett, Northwestern University, (847) 491-2447	Kenametal Co., Dennis Quito, (412) 539-4851	Zirconium oxide-yttrium nano-layered oxide coatings. Novel materials, their properties, and the process of manufacturing of modulated oxide coatings	Thermal barrier coatings for engine applications, optical coatings
2306B	Ceramic and Nonmetallic Materials	Pechenik	Dr Yip-Wah Chung, Northwestern University, (847) 591-3112	Ford Motors Bill Wessels, (313) 323-8984	Further improvements in new laminated carbon nitride/TiN and Carbon nitride ZrN coatings that lead to extreme stability of these coatings in cutting conditions; the process for production of these improved coatings	Cutting tools and drilling inserts for cutting metals, ceramics, and composite materials. Thin films for magnetic memory devices
2306B	Ceramic and Nonmetallic Materials	Pechenik	Dr Yip-Wah Chung, Northwestern University, (847) 591-3112	Timken Co. Harvy Nixon, (330) 471-2046	Ultra-hard carbon nitride coatings and the process to produce them	Major improvements in life of steel bearings
2306B	Ceramic and Nonmetallic Materials	Pechenik	Dr Martin Harmer, Lehigh University, (610) 758-4227	Technology Development Activities Research, Inc. Jack Sibold, (303) 422-7819	Some Rear-Earth additives in very small quantities greatly improve high-temperature performance of aluminum oxide ceramic materials	Refractory fibers for IHPTET engine materials. Particularly intended for applications in combustor, afterburner, and turbine blades
2306B	Ceramic and Nonmetallic Materials	Pechenik	Dr W.P. Hoffman, AFRL Phillips Research Site, (805) 275-5768	Thiokol, John Shigley, (801) 863-2381	Fundamental understanding of the process of pyrolisis and densification of carbon/carbon composites that lead to major reduction of processing time with consequent savings manufacturing costs	Materials for IHPRPT program. Nozzles for rocket propulsion and hypersonic components, aircraft brakes

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2306B	Ceramic and Nonmetallic Materials	Pechenik	Dr W. Kriven, University of Illinois, (217) 333-5258	Pratt & Whitney, Rowena Ecklund, (407) 796-2000	Glass fibers of Yttrium-Aluminum Garnet and Mullite composition exhibiting some of the highest strengths ever measured on glass fibers	Glass fibers for new polymer-matrix composites and possibly for ceramic and metal-matrix composites for applications in engines, white bodies and other structural units
2306B	Ceramic and Nonmetallic Materials	Pechenik	Dr Jack Lackey, GTRC, (404) 894-0573	Ceramic Composites, Knolls Atomic Power Laboratory, Lynne Kolaya, (518) 395-5209	Laminated matrix carbon/SiC composites and the new process for fabricating laminated matrix composites	Possible applications in the area of heat exchangers, and thrust chambers for engines
2306B	Ceramic and Nonmetallic Materials	Pechenik	Dr Ken Sandhage, Ohio State University, (614) 292-6731	Target Materials, Inc. Columbus, OH, J.R. Gains, (614) 486-0261	A novel process for fabricating ceramic sputtering targets of various complicated shapes that utilizes zero-shrinkage features of the novel metal-bearing precursor process that was developed by the investigator	Sputtering targets for coating metals, ceramics, and polymers with thin films. Numerous military applications, such as superconducting thin films for sensors
2306B	Ceramic and Nonmetallic Materials	Pechenik	Dr S. Sumbasevan, Northwestern University, (847) 491-4619	Bobcock & Wilcox, Dr Rich Goettler, (804) 522-06418	A new sol-gel approach to coating fibers and surfaces with a variety of high temperature oxide and non-oxide materials (for example: phosphates)	Materials for land-based and Air Force turbine engines, heat exchangers, hot gas filters
2306C	Organic Matrix Composites	Lee	Dr Roger Morgan, AMEES, Michigan State University, (517) 839-8503	AFRL, Dr David Curliss, (937) 255-9078; BFGoodrich Aerospace R&D, Dr Stan Prybyla, (216) 447-5256; Boeing Commercial Airplane Group, Mr Terry Tsuchiyama, (206) 965-0138; Boeing Defense and Space Grp, Dr Mark Wilenski, (425) 237-0021; GE Aircraft Engines, Mr Rich Price, (513) 243-2971; Lockheed Martin, Mr J. Ed Ingram, (770) 494-8172; NASA Langley Res. Ctr, Dr Norman Johnston, (804) 864-4260; NASA Lewis Res. Ctr, Dr James K. Sutter, (216) 433-3226; Northrop-Grumman Corp., Ms Monica Rommel, (310) 332-6019	Critical Fundamental Aging Mechanisms of High Temperature Polymer, especially bismaleimides (BMIs) and Polyimides (PIs), Matrix Composites	The data utilized in mechanics lifetime model, structural design analyses, accelerated test procedures, health of deployed structures and material selection decisions
2306C	Organic Matrix Composites	Lee	Dr Albert Yee, University of Michigan, (509) 335-4671	AFRL, Brett Bolan, (937) 255-3691 and David Curliss, WL/MLB, (937) 255-9078	Technique and concept of using Positron Annihilation Lifetime Spectroscopy (PALS) to monitor composite cure and degradation	Life and durability prediction of composite components on military aircraft
2307A	Aerodynamics	Walker	Dr Steven Schneider, Purdue University, (765) 494-3343	Lockheed Martin Missiles & Space/AEDC, Mr Chris Thorton, (408) 756-3889	Instrumentation Calibration Technique for High Speed Flows	High frequency pressure transducer calibration for AEDC high speed wind tunnel testing
2307A	Aerodynamics	Walker	Dr Michael Holden, Calspan-UBRC, (716) 631-6853	NATO RTO working group 10, A. Kumar, (757) 864-2283	Experimental Hypersonic Aerodynamics User-Friendly Database	Validation of Computational Fluid Dynamics (CFD) design codes for Hypersonic Air Vehicles
2307B	Turbulence and Internal Flows	Glauser	Drs D.E. Parekh and A.B. Cain, MDA, (314) 233-2526	Dr Yvette S. Webber, AFRL/VAA, (937)-255-6207	Design and scaling guidelines for WL nozzle integration study	Mixing enhancement techniques for C-17 plume temperature reduction; increased flap survivability/durability

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2307B	Turbulence and Internal Flows	Glauser	Dr C.B. Rogers, Tufts University Dr A. Glezer and Dr D.E. Parekh, Georgia Tech., (404) 894-3266	Dr Alan Cain, Boeing (MDA), (314) 233-2526	Characterization of two-phase flow inside nozzle and in jet plume	New high aspect ration nozzle designs currently being developed by MDC Flashjet program
2307B	Turbulence and Internal Flows	Glauser	Drs Ari Glezer and Mark G. Allen, Georgia Tech., (404) 894-3266	Dr Alan Cain, Boeing (MDA) (314) 233-2526 and Dr Richard Wlezien NASA/Langley, (767) 864-5532	Synthetic jet actuators and other novel actuator concepts for use in mixing enhancement, thrust vectoring and aerodynamic shape modification	Flight test program on the YC-15 which is being refurbished as a technology development testbed for the C-17
2307B	Turbulence and Internal Flows	Glauser	Drs C.M. Ho et al UCLA/Caltech, (310) 825-9993	Dr Tom Austin, Boeing (MDA), (310) 982-9555	Development and Implementation of MEMS shear stress sensors	Instrumentation of MD industrial wind tunnel for use in MD aircraft development, NASA/Dryden flight test of micro sensors, sensors for underwater test
2307B	Turbulence and Internal Flows	Glauser	Dr C.M. Ho, UCLA; and Dr Tai, Caltech, (310) 825-9993	Wen Jou, Boeing Co., (206) 234-1261	Microfabricated pressure and shear stress sensors	Potential for wind tunnel and flight test measurements
2307B	Turbulence and Internal Flows	Glauser	Drs F. Ng and T. Diller Virginia Tech, (540) 231-7274	L. Langley, Vatell Corporation, (703) 961-2001	Sputtered thin-film Heat Flux Microsensors directly into the anodized surface of aluminum gas turbine models	Enbedded sensors in turbine blades to measure heatflux without intrusive instruction; allows for high performance turbine engine development
2308A	Space Propulsion and Power	Birkan	Dr R. J. Santoro, Penn State, (814) 863-1285	Fluid Jet Associates, Spring Valley, OH, J. L. Dressler, (937) 885-4731	Demonstrated the capability of a novel electomechanical driven injector element to initiate and sustain combustion instabilities in a controlled manner	Control of combustion instability for impinging jet rocket injectors under high performance conditions for more reliable rockets
2308A	Space Propulsion and Power	Birkan	Dr L. K. Johnson, Aerospace Corp., (310) 336-1998	TRW Space Park, D. Byers, (310) 814-8848	Low-energy singly-charged Xenon ion cross sections	Spacecraft thruster performance analysis
2308A	Space Propulsion and Power	Birkan	Dr L. K. Johnson, Aerospace Corp., (310) 336-1998	Air Force SMC/XR, J. Pollard, (310) 336-4023	Multiply-charged Xenon ion cross sections	Spacecraft integration assessment
2308A	Space Propulsion and Power	Birkan	Dr V. Yang, Penn State, (814) 863-1502	Aerojet, T.V. Nguyen, (916) 355-3664	Supercritical combustion mechanisms	NK-33 LOX/RP-1 engines Expendable launch vehicles
2308A	Space Propulsion and Power	Birkan	Dr V. Yang, Penn State, (814) 863-1502	Pratt & Whitney, C. Cox, (407) 796-2887	Supercritical combustion mechanisms	RL-10V/S, expendable launch vehicles
2308A	Space Propulsion and Power	Birkan	Dr V. Yang, Penn State, (814) 863-1502	NASA, Marshall Space Flight Center, J. Hutt, (205) 544-7125	Supercritical combustion mechanisms correlations of supercritical droplet lifetimes and drag coefficients correlations of pressure-coupled droplet vaporization responses	Engine performance and stability analyses for X-34 reusable launch vehicles Engine performance and stability analyses for SSME upgrades
2308A	Space Propulsion and Power	Birkan	Dr F.E.C. Culick California Institute of Technology, (626) 395-4783	Analytical and Computational Research, Inc., Dr A. Runchal, (301) 471-3023	Time-resolved numerical simulations of unsteady motions in a combustor	To be incorporated into a commercial computer code to design reliable rockets
2308A	Space Propulsion and Power	Birkan	Dr F.E.C. Culick California Institute of Technology, (626) 395-4783	United Technology, Research Laboratory, Dr J. McVey, (860) 610-7084	General analytical framework and reduced-order modeling of combustion instabilities	To be incorporated in design of active control systems or commercial and gas turbine combustors to control jet noise
2308A	Space Propulsion and Power	Birkan	Dr F.E.C. Culick California Institute of Technology, (626) 395-4783	TRW, Dr Martin Mach, (310) 813-9325	Analysis and prediction of combustion instabilities in solid rockets	Buzz problem in Minuteman III, Stage 3

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2308A	Space Propulsion and Power	Birkan	Dr J. W. Rich, Ohio State University, (614) 292-6309	AFRL, Wright-Patterson AFB, and Anteon, Corp., M. L. Lander, (937) 252-3132	High power carbon monoxide laser	Laser-hardened materials evaluation
2308A	Space Propulsion and Power	Birkan	Dr V. V. Subramaniam, Ohio State University, (614) 292-6096	Ford Motor Co, Powertrain Division, J. W. Hoard, (313) 594-1316 Ext 239	Electric discharge-enhanced surface catalysis	Removal of NOx in automotive exhaust for environmental compliance
2308A	Space Propulsion and Power	Birkan	Dr I. V. Adamovich, Ohio State University, (614) 292-0561	AFRL, WPAFB OH, W. L. Bain, (513) 255-2013	Shock weakening in ionized air	Aircraft drag reduction; improved aerodynamic control
2308A	Space Propulsion and Power	Birkan	Dr D.G. Talley, AFRL Phillips Research Site, (805) 275-6174	NASA Marshall Space Flight Center, John Hutt, (205) 544-7125	Model of cross flow effects on orifice discharge coefficients	Used to help develop a fix for SSME Block II engine performance deficit
2308A	Space Propulsion and Power	Birkan	Dr D.G. Talley, AFRL Phillips Research Site, (805) 275-6174	NASA Marshall Space Flight Center, John Hutt, (205) 544-7125	Identify regions of injector instabilities	Used in development of X-34 Fastrac engine
2308A	Space Propulsion and Power	Birkan	Dr D.G. Talley, AFRL Phillips Research Site, (805) 275-6174	NASA Marshall Space Flight Center, John Hutt, (205) 544-7125	Coaxial injector performance at low O/F ratios	Improved SSME and RLV fuel preburner design
2308A	Space Propulsion and Power	Birkan	Dr D.G. Talley, AFRL Phillips Research Site, (805) 275-6174	Energy Research Consultants, Inc., Vince McDonell, (714) 583-1197	Methods to correct for laser sheet and signal attenuation in applying PLIF in sprays	Development of an optical spray patternator for rocket injection system diagnostics
2308A	Space Propulsion and Power	Birkan	Dr M. Martinez-Sanchez, MIT, (617) 253-5613	BUSEK, Inc, Vlad Hruby, (608) 655-5565	Transfer of MIT-developed Hall Thruster PIC simulation code	Design and data analysis for BUSEK's studies on low power Hall Thrusters for Micro Satellites
2308B	Airbreathing Combustion	Tishkoff	Drs Paul Libby and Forman Williams, University of California, San Diego, (619) 534-5492	Dr Alan Turan, Solar Turbines, San Diego CA, (619) 544-2810	Theory for partially premixed turbulent combustion	New method to predict gas turbine exhaust emissions for environmental compliance and signature control
2308B	Airbreathing Combustion	Tishkoff	Dr R. K. Hanson, Stanford University, (415) 723-1745	Dr Mark Allen, Physical Sciences, Inc., Andover MA, (508) 689-0003	Methods of measuring air mass flux by diode laser absorption of oxygen	Planning of flight tests of F/A18 aircraft
2308B	Airbreathing Combustion	Tishkoff	Dr R. K. Hanson, Stanford University, (415) 723-1745	Dr Mark Allen, Physical Sciences, Inc., Andover MA, (508) 689-0003	Methods of measuring air mass flux by diode laser absorption of oxygen	Sensor for compressor surge and stall in gas turbine engines
2308B	Airbreathing Combustion	Tishkoff	Dr R. K. Hanson, Stanford University, (415) 723-1745	Dr Mark Allen, Physical Sciences, Inc., Andover MA, (508) 689-0003	Diode laser absorption sensing of water vapor	Troposphere measurements of water vapor from research aircraft for environmental compliance and signature control
2308B	Airbreathing Combustion	Tishkoff	Dr R. K. Hanson, Stanford University, (415) 723-1745	Dr Peter DeBarber, MetroLaser, Irvine CA, (714) 553-0688	Planar laser-induced fluorescence (PLIF) imaging of nitrous oxide (NO)	Extension of FlameMap commercial PLIF measuring systems for propulsion system testing and other applications
2308B	Airbreathing Combustion	Tishkoff	Dr R. K. Hanson, Stanford University, (415) 723-1745	Dr Mike Holden, Calspan Corporation, Buffalo NY, (716) 631-6853	Diode laser-based sensor for gas dynamic properties and water vapor	Instrumentation for hypersonic shock tunnel for high-speed aerodynamics research, development and testing
2308B	Airbreathing Combustion	Tishkoff	Dr R. K. Hanson, Stanford University, (415) 723-1745	Dr Peter DeBarber, MetroLaser, Irvine CA, (714) 553-0688	Tunable diode laser (TDL) absorption sensor for hydrazine and monomethylhydrazine (MMH)	Sensing of MMH pollution at the launch pad for space shuttle launches
2308B	Airbreathing Combustion	Tishkoff	Dr R. K. Hanson, Stanford University, (415) 723-1745	Dr Tom Fric, GE Research Center, Schenectady NY, (518) 387-5791	Acetone tracer for PLIF imaging	Fuel-air mixing studies for gas turbine combustor design and development

Subarea	Title	PM	Performer	Customer	Result	Military Utility
2308B	Airbreathing Combustion	Tishkoff	Dr R. K. Hanson, Stanford University, (415) 723-1745	Ms. Beth Hinchlee, Caterpillar, Peoria IL, (309) 578-8725	Acetone tracer for PLIF imaging	Fuel-air mixing studies for gas turbine engine design and development
2308B	Airbreathing Combustion	Tishkoff	Dr R. K. Hanson, Stanford University, (415) 723-1745	Dr Michael Winter, United Technologies Research Center, East Hartford CT, (860) 610-7805	Acetone tracer for PLIF imaging	Fuel-air mixing studies in gas turbine combustors
2308B	Airbreathing Combustion	Tishkoff	Dr R. K. Hanson, Stanford University, (415) 723-1745	Dr Michael Winter, United Technologies Research Center, East Hartford CT, (860) 610-7805	PLIF imaging for NO	NO measurements to control oxides of nitrogen for environmental compliance and signature reduction in future gas turbine combustors
2308B	Airbreathing Combustion	Tishkoff	Dr R. K. Hanson, Stanford University, (415) 723-1745	Dr Klaus Schadow, Naval Air Warfare Center, China Lake CA, (619) 939-6532	Multiplexed diode-laser temperature sensors	Real-time control of a 50 kW forced combustion incinerator under the DoD SERDP Program
2308B	Airbreathing Combustion	Tishkoff	Dr R. K. Hanson, Stanford University, (415) 723-1745	Dr Klaus Schadow, Naval Air Warfare Center, China Lake CA, (619) 939-6532	Diode laser sensing in a multipass cell using a probe	Measurement of combustion chemical species (CO, CO2, C2H4, CH4) to monitor the performance of a 50-kW forced combustion hazardous waste incinerator
2308B	Airbreathing Combustion	Tishkoff	Dr S. B. Pope, Cornell University, (607) 255-4314	Dr M.S. Anand, Allison Engine Company, Indianapolis IN, (317) 230-2828	Euclidian Minimum Spanning Tree turbulent mixing model	Upgrade to design code for gas turbine combustors
2308B	Airbreathing Combustion	Tishkoff	Dr S. B. Pope, Cornell University, (607) 255-4314	Dr M.S. Anand, Allison Engine Company, Indianapolis IN, (317) 230-2828	Wavevector model for turbulent transport	Upgrade to design code for gas turbine combustors
2308B	Airbreathing Combustion	Tishkoff	Dr S. B. Pope, Cornell University, (607) 255-4314	Dr A. T. Norris, Ohio Aerospace Institute, Cleveland OH, (216) 962-3071	Trajectory generated low dimensional manifold model for combustion chemistry	Chemical kinetic model for the NASA National Design Code for gas turbine combustors
2308B	Airbreathing Combustion	Tishkoff	Dr W. J. A. Dahm, University of Michigan, (313) 764-4318	Dr Ben Breen, Energy Systems Associates, Pittsburgh PA, (412) 429-3259	d+ method for heat release effects on mixing	Fuel-lean gas reburning at Commonwealth Edison Joliet Unit 6 facility and Duquesne Light Company Elrama Unit 2
2308B	Airbreathing Combustion	Tishkoff	Dr W. J. A. Dahm, University of Michigan, (313) 764-4318	Dr Sho Kobayashi, Praxair, Tarrytown NY, (914) 345-6470	d+ method for heat release effects on mixing	Analysis of dilute oxygen combustion system test data for industrial and home heating furnace design
2308B	Airbreathing Combustion	Tishkoff	Dr W. J. A. Dahm, University of Michigan, (313) 764-4318	Dr Tom Robertson, North American Manufacturing Company, Cleveland OH, (216) 271-6000	d+ method for heat release effects on mixing	Development of LNI, LEx, and LExII low-NOx gas burners for industrial and home heating furnace design
2308B	Airbreathing Combustion	Tishkoff	Dr S. M. Correa, General Electric Corporate Research and Development Center, (518) 387-5853	David L. Burrus, General Electric Aircraft Engines, Evendale OH, (513) 243-2611	Monte Carlo methods and physical/chemical submodels for combustion	Upgrades to the CONCERT and ACC aircraft gas turbine combustor design codes
2308B	Airbreathing Combustion	Tishkoff	Dr R. J. Santoro, Pennsylvania State University, (814) 863-1285	Dr Wei Chen, ABB Combustion Research, Windsor CT, (860) 285-2166	Data on soot, velocity, species, and temperature fields in laminar flames	Validation of efficient, environmentally compliant furnace design code

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2308B	Airbreathing Combustion	Tishkoff	Dr R. J. Santoro, Pennsylvania State University, (814) 863-1285	Mr Kevin Zyst, Arnold Engineering Development Center, Arnold AFB TN, (931) 454-6507	Laser-induced incandescence measurement technique	Optical diagnostic for characterizing gas turbine smoke
2308B	Airbreathing Combustion	Tishkoff	Dr R. J. Santoro, Pennsylvania State University, (814) 863-1285	Dr John Garman, Rice Systems, Inc., Irvine CA, (714) 553-8768	Laser-induced incandescence measurement technique	Diagnostic for smoke measurements in aircraft exhaust plumes
2308B	Airbreathing Combustion	Tishkoff	Dr G. Tryggvason, University of Michigan, (313) 763-1049	Dr E. Steinthorsson, Parker Hannifin Corp., Cleveland OH, (216) 954-8115	Finite difference/front tracking numerical method	Design methodology for simplex fuel injectors for furnaces and propulsion systems
2308B	Airbreathing Combustion	Tishkoff	Dr H. Hornung, California Institute of Technology, (818) 395-4551	Dr E. Slimco, Jet Propulsion Laboratory, Pasadena CA, (818) 354-5940	T5 shock tunnel hypersonic flow experiments	Acceleration tests for the NASA Mars Penetrator
2308B	Airbreathing Combustion	Tishkoff	Dr T. Edwards, AFRL, WPAFB OH, (937) 255-3524	Dr Andy Brancovic, Pratt & Whitney Engines, West Palm Beach FL, (561) 7796-8811	Computer code to predict fuel fouling in injectors	Design of new injectors for advanced gas turbine engines
2308B	Airbreathing Combustion	Tishkoff	Dr M. B. Colket, United Technologies Research Center, (860) 610-7481	Dr M. B. Colket, United Technologies Research Center, East Hartford CT, (860) 610-7481	Soot production and aerosol dynamics computer model	Network perfectly stirred reactor combustion code for aircraft gas turbine combustor design
2308B	Airbreathing Combustion	Tishkoff	Dr W. M. Roquemore, AFRL, WPAFB OH, (937) 255-6813	Mr J. Hartranft, NAVSEA, Arlington VA, (703) 602-2706	Trapped vortex combustor concept	Low NOx replacement combustor for General Electric LM2500 shipboard gas turbine propulsion system
2308B	Airbreathing Combustion	Tishkoff	Dr I. Boyd, Cornell University, (607) 255-4563	Dr D. Hash, NASA Ames Research Center, Moffett Field CA, (415) 604-1147	MONACO direct simulation Monte Carlo numerical code	Design model for low pressure chemical vapor deposition reactors used to process semi-conductors
2308B	Airbreathing Combustion	Tishkoff	Dr I. Boyd, Cornell University, (607) 255-4563	Dr J. Taylor, Johns Hopkins University Applied Physics Laboratory, Laurel MD, (301) 953-6000	MONACO direct simulation Monte Carlo numerical code	Model prediction and verification of results from the MSX hypersonic flight experiment
2308B	Airbreathing Combustion	Tishkoff	Dr I. Boyd, Cornell University, (607) 255-4563	Dr M. Marconi, AER, Inc., Cambridge MA, (617) 547-6207	MONACO direct simulation Monte Carlo numerical code	Modeling of volcanic plumes on the moon
2310B	Ionospheric Research	Bellaire	Dr Jack Jasperse, AFRL, Phillips Research Site, (781) 377-3083	Dr Richard Link, Southwest Research Institute (SWRI), San Antonio, TX (210) 552-2733	Computer code for calculating energy deposition rates of proton and electron aurora	Analysis of data from the Upper Atmospheric Research Satellite (UARS)
2310B	Ionospheric Research	Bellaire	Dr Edward Weber, AFRL, Phillips Research Site, (781) 377-3121	Major Mike Christie, HQ AFSPC/DORW, Peterson AFB, CO, DSN 692-3242	Scintillation Network Decision Aid (SCINDA) prototype	L-band communication outage maps for DoD operations, giving GPS and GOES satellite outages in real time
2310B	Ionospheric Research	Bellaire	Dr Richard Picard, AFRL, Phillips Research Site, (781) 377-2222	Robert O'Neil, AFRL/VSBM, Hanscom AFB, MA (781) 377-4775	Models of radiative and gravity wave processes in the atmosphere	Analysis of MSX satellite data
2310B	Ionospheric Research	Bellaire	Dr Richard Picard, AFRL, Phillips Research Site, (781) 377-2222	Dr Martin Mlynczak, NASA Langley Research Center, VA (757) 864-5695	Non-LTE high-altitude radiance codes	Design of the SABER instrument on the TIMED satellite
2310B	Ionospheric Research	Bellaire	Dr Richard Picard, AFRL, Phillips Research Site, (781) 377-2222	Lt Col Paul Wolf, Professor of Physics, AFIT/ENP, WPAFB, OH (937) 255-3636, Ext 4560	Spectroscopic simulation and data analysis software	Laboratory analysis of plume and atmospheric spectra; production of synthetic spectra

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2310B	Ionospheric Research	Bellaire	Dr Laurence Rothman, AFRL Phillips Research Site, (781) 377-2336	Dr Michael King, EOS Senior Scientist, NASA Goddard Space Flight Center, MD (301) 286-8228	High Resolution Transmission Model (HITRAN) & HAWKS atmospheric parameters databases on CD-ROM	Remote sensing and monitoring of atmospheric constituents
2310B	Ionospheric Research	Bellaire	Dr Laurence Rothman, AFRL Phillips Research Site, (781) 377-2336	Dr Ted Cress, Batelle Pacific Northwest Laboratory, Richland, WA (509) 375-6964	HITRAN & HAWKS atmospheric parameters databases on CD-ROM	Global change monitoring and atmospheric backgrounds modeling for Dept. of Energy Atmospheric Radiation Measurement (ARM) Program
2310B	Ionospheric Research	Bellaire	Dr Laurence Rothman, AFRL Phillips Research Site, (781) 377-2336	Numerous customers via World Wide Web; primarily developed for Sandra Weaver, National Air Intelligence Center, WPAFB, OH, DSN 787-7071	HITRAN, HITEMP, & HAWKS atmospheric parameters databases on CD-ROM	Improved atmospheric transmission codes for optimizing surveillance and targeting
2310B	Ionospheric Research	Bellaire	Dr Min Chang Lee, MIT, (781) 253-5966	Linda Harden, Patents Clerk, AFOSR, Bolling AFB, DC (202) 767-4966	Patent	Industrial growth of crystals on orbit
2310B	Ionospheric Research	Bellaire	Dr Tom Chang, MIT, (781) 253-7523	Dr Jack Jasperse, AFRL, Phillips Research Site, Hanscom AFB, MA (781) 377-3083; also Naval Research Lab, Aerospace Corp., and USAF Space Systems Division	Computer model to calculate the pitch-angle scattering of electrons and ions in the ionosphere and provide near real-time predictions of solar extreme ultraviolet (EUV) and x-ray fluxes	Spacecraft design and calibration guidelines, space weather prediction, and satellite operations
2310B	Ionospheric Research	Bellaire	Dr Tom Chang, MIT, (781) 253-7523	Dr John Retterer, AFRL, Phillips Research Site, Hanscom AFB, MA (781) 377-3891; also Univ. of California at Berkeley, Marshall Space Flight Center, and others	Theory describing ion cyclotron resonance and lower hybrid turbulence heating in the ionosphere	Spacecraft instrument and experiment design
2310B	Ionospheric Research	Bellaire	Dr Tom Chang, MIT, (781) 253-7523	Dr Bamandas Basu, AFRL Phillips Research Site, Hanscom AFB, MA (781) 377-3048; also Marshall Space Flight Center, Lockheed-Martin Space Research Laboratory, and others	Global kinetic model of Earth's photoelectron-driven polar wind	Spacecraft instrument and experiment design
2310B	Ionospheric Research	Bellaire	Dr Jack Jasperse, AFRL Phillips Research Site, (781) 377-3083	Dr R. Daniell, Computational Physics, Inc., HQ at Fairfax, VA (781) 487-2250	Computer code for calculating latitudinal spreading of proton aurora	Upgrade to the Parameterized Real-time Ionospheric Specification Model (PRISM) in operational use at the 55th Space Weather Squadron at Peterson AFB, CO
2310C	Atmospheric Physics	Bellaire	Dr Richard Pfeffer, FSU, (904) 644-5594	Dr Owe Axelsson, University of Nijmegen, Netherlands, 31-24-3653231	Numerical model to provide solutions to singularly perturbed elliptical problems	Modeling sharp boundary layers; useful for weather prediction, cloud modeling, wind shear forecasting
2310C	Atmospheric Physics	Bellaire	Dr Richard Pfeffer, FSU, (904) 644-5594	Dr David Furbish, Dept of Geology, Florida State University, Tallahassee, FL (850) 644-5892	Numerical models of diffusion and momentum transport	Calculation of the effect of sand dunes on the vertical transport of horizontal momentum by winds; useful for smoke and chemical dispersion modeling

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2310C	Atmospheric Physics	Bellaire	Dr William Blumen, University of Colorado, (303) 492-8770	Dr Paul Try, International GEWEX Project Office, Silver Spring, MD, (301) 427-2089, Ext 521	Boundary layer meteorological data from MICROFRONTS experiment	Global Energy and Water Cycle Experiment (GEWEX) model; useful for predicting ground trafficability and precipitation
2310C	Atmospheric Physics	Bellaire	Dr William Blumen, University of Colorado, (303) 492-8770	Dr Paul Try, International GEWEX Project Office, Silver Spring, MD, (301) 427-2089, Ext 521	Data quality control protocols	Efficient utilization of all surface data collected worldwide in the GEWEX campaign; directly improves weather modeling
2310C	Atmospheric Physics	Bellaire	Dr William Blumen, University of Colorado, (303) 492-8770	Doug Sisterson, ARM Southern Great Plains CART Site Program Manager, Argonne National Laboratory, IL (630) 252-5836	Boundary layer meteorological data from MICROFRONTS experiment	Archive for the Atmospheric Radiation Measurement (ARM) Clouds And Radiation Testbed (CART); data used for modeling the behavior of sensors for UV, IR, TV, and laser guided munitions
2310C	Atmospheric Physics	Bellaire	Dr Kuo Nan Liou, University of Utah, (801) 581-3336	Numerous customers via World Wide Web; Dr Paul Try, International GEWEX Project Office, Silver Spring, MD (301) 427-2089, Ext 521	Radiative transfer parameterization code	Retrieval of global radiative fluxes observed by satellites; data used for modeling the behavior of sensors for UV, IR, TV, and laser guided munitions
2310C	Atmospheric Physics	Bellaire	Dr Larry Mahrt, Oregon State University, (541) 737-5691	Numerous customers via World Wide Web; first developed for Dr Sam Chang, AFRL, Phillips Research Site, Hanscom AFB, MA (781) 377-2954	Atmospheric boundary layer model	Global numerical weather prediction and operational regional weather forecasting
2310C	Atmospheric Physics	Bellaire	Dr V. N. Bringi, Colorado State University, (303) 491-6600	Dr Richard Doviak, National Severe Storms Laboratory, Norman, OK (405) 366-0427	Simultaneous transmit/alternate receive (STAR) mode polarized radar data	Upgrade operational polarization mode of WSR-88D Doppler radar for NOAA (and ultimately the DoD)
2310C	Atmospheric Physics	Bellaire	Dr V. N. Bringi, Colorado State University, (303) 491-6600	Chuck Frush, Atmospheric Technology Division, NCAR, Boulder, CO (303) 497-2051	Random phase and polarization radar data	Coding techniques to mitigate range & velocity ambiguities for WSR-88D Doppler radar
2310C	Atmospheric Physics	Bellaire	Dr V. N. Bringi, Colorado State University, (303) 491-6600	Dr Edward Brandes, Research Applications Program, NCAR, Boulder, CO (303) 497-8487	Differential phase algorithm for S-band polarized radar	Improved hydrology algorithms using rain rates derived from radar polarimetry; important for Army support, ground trafficability, and airlift issues
2311A	Space Physics	Radoski	Dr Richard Neidig, Mr Wiborg, AFRL Phillips Research Site, (505) 434-7019	Capt K. Riesbeck, SMC/CI, Los Angeles AFB, CA (310) 336-4181	Engineering and design phase of prototype telescope for Solar Optical Observing Network (SOON)	Meet Air Force Space Command's need to upgrade SOON. Solar data will be collected and delivered to 55 Space Weather Squadron (SWXS) forecast center in Colorado Springs
2311A	Space Physics	Radoski	Dr S. L. Keil, AFRL Phillips Research Site, (505) 434-7039	Capt Ron Santoro, Chief, SMC/XRTE, DSN 433-0747	Road map for the future of solar observations and modeling	Meet deficiencies for space weather forecasting in AFSPC mission needs and area plans
2311A	Space Physics	Radoski	Dr Richard C. Altrock, AFRL Phillips Research Site, (505) 434-7016	Maj R. Kutzman, AFSPC/55 SWX, Falcon AFB, CO, (719) 554-9140	Daily maps and scans of solar coronal intensity	Used as input for daily NOAA and DoD forecasts of solar and geophysical parameters; important to satellite longevity and operations

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2311A	Space Physics	Radoski	Dr Richard C. Altrock, AFRL Phillips Research Site, (505) 434-7016	Maj Michael Volek, AFSPC, (719) 554-9137	Information on solar coronal observing systems	Fill gaps in the USAF Space Command requirements & capabilities matrix for C4I, global space dominance, and environmental monitoring
2311A	Space Physics	Radoski	Dr Richard C. Altrock, AFRL Phillips Research Site, (505) 434-7016	Ms Helen. Coffey, NOAA/NESDIS/NGDC, Boulder, CO (505) 434-7016	Synoptic maps and daily intensity scans of the solar corona	NOAA/Solar Geophysical Data; used by investigators needing data on spatial and temporal variation of the solar corona for space weather prediction
2311A	Space Physics	Radoski	Dr Richard C. Altrock, AFRL Phillips Research Site, (505) 434-7016	Mr Robert McGraw, National Solar Observatory, NM, (505) 434-7038	Coronal data	Used by USAF investigators needing data on spatial and temporal variation of the solar corona for space weather prediction
2311A	Space Physics	Radoski	Dr Richard C. Altrock, AFRL Phillips Research Site, (505) 434-7016	Mr Kevin Scro, AFSPC/55SWX, Falcon AFB, CO, DSN 560-6313	Information on interpretation of a coronal data product	Used for locating coronal holes for early identification of solar regions likely to produce energetic particle events; needed for effective space weather prediction
2311A	Space Physics	Radoski	Dr Richard C. Altrock, AFRL Phillips Research Site, (505) 434-7016	Dr Jeffrey Newmark, Applied Research Co., Landover, MD, (301) 286-3163	Solar data: coronal scans, latitude - averaged intensities and limb full-disk fluxes	To determine a solar EUV intensity proxy for use in modeling space weather
2311A	Space Physics	Radoski	Dr Richard Radick, Phillips Research Site, (505) 434-7035	G. Loos, (605) 846-4410 and R. Carreras, AFRL Phillips Research Site, (6.2) Space Based Imaging	Demonstration of compensation of telescope slowly varying aberrations by a liquid crystal wavefront corrector	Assess the feasibility of using low cost, liquid crystal wavefront correction for compensating optical errors in deployable space imaging systems
2311A	Space Physics	Radoski	Dr Donald F. Neidig, Phillips Research Site, (505) 434-7019	Capt K. Fiesbeck, Capt. D. Pry, SMC/CI, Los Angeles AFB, CA, (310) 336-4181	Cost estimate for vector magnetograph retrofit of the Improved Solar Optical Observing Network (ISOON)	Enhanced capability provided by addition of vector magnetic field measurements to predict solar flares based on solar surface pre-flare magnetic conditions; needed for effective space weather prediction
2311A	Space Physics	Radoski	Dr Donald F. Neidig, Mr P.H. Wiborg, Phillips Research Site, (505) 434-7019	Mr A. Ronn, TRW Systems, (719) 570-8217, Maj. R. Kutzman, AFSPC/55SWSX, (719) 554-9140	Information on integrated operation for the Solar Electro-Optical Network (SEON)	A new integrated solar analysis and forecasting system for space weather prediction, incorporating knowledge of solar analysis techniques developed in previous USAF 6.1 programs
2311A	Space Physics	Radoski	Dr Gregory Ginet, Phillips Research Site, (781) 377-3070	Lt Col C.D. Woodard, Space Battlelab, Falcon AFB, CO DSN 560-9968, (719) 567-9968	Concept for space particle modification for offense/defense	Define new technologies suitable for the Space Battlelab to advance USAF Core Competencies in air and space power
2311A	Space Physics	Radoski	Dr Stephen Kahler, Mr David Webb, Phillips Research Site, Comm/DSN: (781) 377-9665/478-9665	Dr Ronald Turner, ANSER, Arlington VA, (702) 416-3264	Information to estimate the ratio or large solar energetic particle events to coronal mass ejections over the solar cycle	Enable ANSER to advise NASA on environmental effects for future space missions to evaluate the radiation hazard that unprotected astronauts might encounter on long deep space missions

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2312A	Bioenvironmental Sciences	Kozumbo	Harvey Paige, AFRL/ML, WPAFB, OH, (937) 255-9038	Dr Michael J. Frisch, Gaussian Inc., Pittsburgh, PA, (412) 279-6700	The IRCMax method was developed for the computation of accurate barrier heights of chemical reactions using ab initio computational theory	The IRCMax method is being incorporated into the "Gaussian 98" software package for use in kinetics modeling of combustion chemistry and improving propulsion fuels
2312A	Bioenvironmental Sciences	Kozumbo	Dr Jim Spain, AFRL/ML, Tyndall AFB, FL, (904) 283-6058	Dr Rakesh Bajpai, US Army Corps of Engineers, Waterways Experiment Station, MS, (601) 634-2994	Aerobic bacteria were discovered that are able to degrade dinitrotoluenes completely	The bacteria have been used to develop bioreactors for use in cleaning up munitions wastes at Army ammunition plants
2312A	Bioenvironmental Sciences	Kozumbo	Dr Jim Spain, AFRL/ML, Tyndall AFB, FL, (904) 283-6059	Capt. Tom Devenough, Kelly AFB, DSN 945-1815	The molecular mechanism by which bacteria naturally develop the capacity to degrade chlorobenzenes at contaminated sites was discovered	Application of this mechanism can result in the adoption of new passive (low cost) cleanup strategies that can ultimately save up to an estimated $3B for the military
2312A	Bioenvironmental Sciences	Kozumbo	Drs Wade Weisman/Jim McDougal, AFRL/HE, (937) 244-6327	Dr Sid Soderholm, NIOSH, Morgantown, WV, (304) 285-6034	Experimental methods were developed for modeling in vitro and in vivo dermal absorption of chemicals	These methods will be used to determine how much of any chemical is absorbed through skin and, ultimately, to set national human health standards
2312A	Bioenvironmental Sciences	Kozumbo	Drs Richard Guy, Annette Bunge, CO School of Mines, Golden, CO, (303) 273-3722	Drs Kim-Chi Hoang, Robert Zendzian, US EPA, Washington, DC, (202) 260-8911 and (703) 305-5495	A citation database (SkinBase) and a full-text library archive (SkinLit) were constructed	The database and archive will be used as a focused resource to assess the potential health risk of dermal exposure to toxic chemicals
2312A	Bioenvironmental Sciences	Kozumbo	Drs Richard Guy, Annette Bunge, CO School of Mines, Golden, CO (303) 273-3722	Drs Kim-Chi Hoang, Robert Zendzian, US EPA, Washington, DC, (202) 260-8911 and (703) 305-5495	An in vitro database of measured permeability coefficients of 200 chemicals across human and animal skins was constructed	The database will be used as a quantitative resource to assess the potential health risk of dermal exposure to toxic chemicals
2312A	Bioenvironmental Sciences	Kozumbo	Drs Richard Guy, Annette Bunge, CO School of Mines, Golden, CO (303) 273-3722	Drs Kim-Chi Hoang, Curtis Dary, Nancy Chiu, US EPA, Washington, DC, (202) 260-8911, (702) 798-2286, and (202) 260-7587	Algorithms were developed and validated to predict dermal absorption of a chemical in aqueous solution	The algorithms will be used as a tool to assess the potential health risk of dermal exposure to toxic chemicals
2312A	Bioenvironmental Sciences	Kozumbo	Drs Richard Guy, Annette Bunge, CO School of Mines, Golden, CO (303) 273-3722	Drs Kim-Chi Hoang, US EPA, Washington, DC, (202) 260-8911	A literature review of data describing the absorption of metal-based compounds across mammalian skin was developed	The quantitative review will be used as an information source to assess the potential health risk of dermal exposure to toxic chemicals
2312A	Bioenvironmental Sciences	Kozumbo	Drs Richard Guy, Annette Bunge, CO School of Mines, Golden, CO (303) 273-3722	Dr Curtis Dary, US EPA, Washington, DC, (702) 798-2286	An algorithm was developed and validated to predict permeation across human skin of a solvent deposited chemical	The algorithm will be used as a tool to assess the potential health risk involved when toxic chemicals are deposited onto human skin from liquids that evaporate
2312A	Bioenvironmental Sciences	Kozumbo	Dr Cynthia A. Toth, Duke University Eye Center, (919) 684-5631	Dr Joseph Izatt, Case Western Reserve University Hospital, Cleveland OH, (216) 844-7928	Histological micrographs of laser-induced retinal lesions were compared to lesion images produced by Optical Coherence Tomography	The comparative information would be used to improve medical diagnosis of retinal eye damage as assessed by the non-invasive diagnostic technology of Optical Coherence Tomography
2312A	Bioenvironmental Sciences	Kozumbo	Dr Johnathan Kiel, AFRL/HE, Brooks AFB, TX, (210) 536-3583	Dr Martin Meltz, Beam Tech Corp., San Antonio, TX, (210) 647-9777	Radiofrequency radiation (RFR) induces slow fluorescence of diazoluminomelanin (DALM) in the solid state	DALM is being used to construct personal film badges to measure RFR exposure for occupational health and safety reasons in military and industry

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2312A	Bioenvironmental Sciences	Kozumbo	Dr Johnathan Kiel, AFRL/HE, Brooks AFB, TX, (210) 536-3583	John McCoy or Harris Gold, Foster-Miller Inc., Waltham, MA, (617) 684-4000	Biosynthetic diazoluminomelanin (DALM) acts as a redox catalyst in the degradation of hydrazines	DALM will replace an enzyme component in a superabsorbent gel complex that is used to degrade environmental hydrazine contamination on military and industrial sites
2312A	Bioenvironmental Sciences	Kozumbo	Dr Johnathan Kiel, AFRL/HE, Brooks AFB, TX, (210) 536-3583	Dr Femi Ayorinde, SERDP, Arlington, VA, (703) 696-2117	Biosynthetic diazoluminomelanin (DALM) was shown to catalyze the degradation of hydrazines	DALM will replace an enzyme component in a superabsorbent gel complex that is used to degrade environmental hydrazine contamination on military and industrial sites
2312A	Bioenvironmental Sciences	Kozumbo	Dr Johnathan Kiel, AFRL/HE, Brooks AFB, TX, (210) 536-3583	Mr Ron Hunt, WL/MNSA, Technology Assessment Branch, Eglin AFB, FL., (904) 882-4651	Supported the Colt45 test for Afent Defeat Weapons Program (classified) using medium protected under U.S. Patent # 5,156,971 (20 Oct 92)	The result was used to validate weapon effectiveness
2312A	Bioenvironmental Sciences	Kozumbo	Dr Johnathan Kiel, AFRL/HE, Brooks AFB, TX, (210) 536-3583	Lt. Kelly S. Lowder, SA/ALC/NWIC, Kirtland AFB, NM, (505) 583-1124	Developed a recombinant DNA non-replicating virus for testing the effects of heat and ultraviolet on viral survival	The virus was used to validate weapon defeat models
2312A	Bioenvironmental Sciences	Kozumbo	Dr Johnathan Kiel, AFRL/HE, Brooks AFB, TX, (210) 536-3583	Mr Dennis J. Kravec, CBD Agency, Aberdeen Proving Grounds, MD, (410) 671-5687	Solid-state photchemistry of DALM combined with random generated DNA that binds chem/bio agents to produce a distinct fluorescent signature	The DNA-DALM complex will be used as a main component to construct universal sensor for identifying known chem/bio agents and gaining signatures of unknown agents
2312A	Bioenvironmental Sciences	Kozumbo	Dr Charles Myers, Medical College of WI, Milwaukee, WI, (414) 257-8593	Dr Sonia de Morais, Boehringer Ingelheim Pharmaceuticals, Rigdgefield, CT, (203) 798-5789	An antipeptide antibody that specifically recognizes the major human flavin-containing monooxygenase FMO3 was developed	The antibody will be used in the development of pharmaceutical agents
2312A	Bioenvironmental Sciences	Kozumbo	Dr Ronald Crawford, University of Idaho, Moscow, ID (208) 885-6580	Dr Russ Kaake, J.R. Simplot Company, Pocatello, ID (208) 235-5699	Specific bacterial preparations can degrade nitrogen-based explosives	The bacterial preparations are used to degrade explosive residues contaminating boreholes drilled for seismic testing of geologic formations
2312A	Bioenvironmental Sciences	Kozumbo	Dr Gerald LeBlanc, North Carolina State University, Raleigh, NC, (919) 515-7404	Ms. Emily Dionne, Springborn Laboratories, Wareham, MA, (508) 295-2550	Methods were developed for the analysis of vitellogenin protein in fish as an indicator of estrogenic properties of chemicals	Methods would be used to develop an easy-to-use, rapid toxicity test to identify chemicals with estrogen-like properties
2312A	Bioenvironmental Sciences	Kozumbo	Dr Gerald LeBlanc, North Carolina State University, Raleigh, NC, (919) 515-7404	Dr Mark Tayler, Institute for Environment and Health, University of Leicester, Leicester, United Kingdom 0116-223-1611, Lynn Goldman, EPA, Washington, DC, (202) 260-1847	Methods were developed for the detection of chemically induced metabolic androgenization in invertebrates	The methods are being considered by the European Community for use as a standard toxicity test for chemicals with endocrine disrupting potential
2312A	Bioenvironmental Sciences	Kozumbo	Dr Subhash Basak, University of MN, Duluth MN, (218) 720-4230	Dr Stanley Young, Glaxo-Wellcome, Research Triangle Park, NC, (919) 483-8456, Mir. Mic Lajiness, The Upjohn Company, Kalamazoo, MI, (616) 833-1794	Software (APPROBE) was developed that is capable of calculating substructural molecular descriptors of chemicals	APPROBE software can be used to computationally design novel drugs for the treatment of diseases

Subarea	Title	PM	Performer	Customer	Result	Military Utility
2312A	Bioenvironmental Sciences	Kozumbo	Dr Subhash Basak, University of MN, Duluth MN, (218) 720-4230	Mr Toshi Komatsu, Chromaline Corporation, Duluth, MN, (218) 628-2217	Software (TICPAC and GENETOX) was developed that is capable of predicting lipophilicity and genotoxicity of novel photoactive chemicals	The software is used in the design of environmentally benign chemicals
2312A	Bioenvironmental Sciences	Kozumbo	Dr Mark Smulson, Georgetown University, Washington, DC, (202) 687-1718	Dr Sam Wells, BIO-RAD Laboratories, Hercules, CA, (510) 741-6810	An assay was developed to measure the activity of an enzyme that cleaves poly(ADP-ribose) polymerase and is an early marker for programmed cell death	The assay is used as a toxicity test for chemicals that produce cell death by apoptosis
2312A	Bioenvironmental Sciences	Kozumbo	Dr Mark Smulson, Georgetown University, Washington, DC (202) 687-1718	Dr Sam Wells, BIO-RAD Laboratories, Hercules, CA, (510) 741-6810	An assay was developed to measure DNA breaks by combining fluorescent and chemiluminescent indicator complexes with the DNA-binding portion of poly(ADP-ribose) polymerase	The assay is used to test agents for their ability to damage DNA and potentially cause cancer
2312A	Bioenvironmental Sciences	Kozumbo	Dr Benjamin Rockwell, AFRL/HE, Brooks AFB, TX, (210) 536-4790	Dr David Sliney, International Commission on Non-Ionizing Radiation Protection, (410) 671-3932	Minimum Visible Lesion Threshold levels were measured for infrared laser-induced damage in retinal tissue	Interim Maximum Permissible Exposure levels were recommended to the DoD laser safety community
2312A	Bioenvironmental Sciences	Kozumbo	Dr Benjamin Rockwell, AFRL/HE, Brooks AFB, TX, (210) 536-4790	Dr David Sliney, Laser Optical Radiation Program, US Army Center for Health Promotion and Preventive Medicine, (410) 671-3932	Minimum Visible Lesion Threshold levels were measured for infrared laser-induced damage in retinal tissue	Interim Maximum Permissible Exposure levels were recommended to the DoD laser safety community
2312A	Bioenvironmental Sciences	Kozumbo	Dr Terence Risby, Johns Hopkins University, Baltimore MD, (410) 955-0024	Mr Alan Ganz, Perkin Elmer Corporation, Wilton, CT, (203) 761-2702	Methodologies and customized equipment were developed to measure chemicals exhaled in breath as a result of chemical exposures	The methods and instrumentation for breath analysis are used to estimate health status and risks resulting from chemical exposures and disease processes
2312A	Bioenvironmental Sciences	Kozumbo	Dr Terence Risby, Johns Hopkins University, Baltimore MD, (410) 955-0024	Dr Joseph Rifkind, Gerontolaogy Research Center, National Institute of Aging, Baltimore, MD	Methodologies and customized equipment were developed to measure chemicals exhaled in breath as a result of chemical exposures	The methods and instrumentation for breath analysis are used to determine normal and accelerated aging processes in animals and humans
2312A	Bioenvironmental Sciences	Kozumbo	Dr Frank Witzmann, Indiana Univ.-Purdue University, Columbus IN, (812)-348-7215	Dr Ray Grant, Proctor & Gamble Co., Cincinnati, OH, (513)-627-2179	Techniques were developed for large-scale two-dimensional protein electrophoresis and image analysis. (These techniques are in addition to those reported in FY96)	Biotechnology will be used to research and develop drugs and pharmaceutical products
2312A	Bioenvironmental Sciences	Kozumbo	Dr Frank Witzmann, Indiana Univ.-Purdue University, Columbus IN, (812)-348-7215	Dr N. Leigh Anderson, Large Scale Biology Corp., Rockville, MD, (301)-424-5989	Proteins were identified on two-dimensional electrophoretic maps. (These proteins are in addition to those reported in FY96)	Data were added to the Tissue Effects Database under development at Large Scale Biology Corporation
2312A	Bioenvironmental Sciences	Kozumbo	Drs. Mark Witten & David Harris, Univ. of Arizona, Tucson, AZ (520)-626-2610 and (520)-621-6271	Dr Charles Holland, Searle, Chicago, IL, (847) 967-2070; Dr Paul Blake, SmithKline Beecham Pharmaceuticals, Collegeville, PA	Substance P protocol protected the immune system from damage by jet fuel, and reduced effects of virus infection and tumor growth	Substance P will be tested as an immune stimulant therapy to combat virus infection and cancer
2312A	Bioenvironmental Sciences	Kozumbo	Drs. Mark Witten & David Harris, Univ. of Arizona, Tucson, AZ (520)-626-2610 and (520)-621-6271	Charles E. Romero, Broadview Consultants, Inc., New Rochelle, NY, (914) 235-1418	Substance P protocol protected the immune system from damage by jet fuel, and reduced effects of virus infection and tumor growth	As an investment capital firm, Broadwiew Consultants is considering the financing of clinical trials for substance P patented therapy
2312C	Chronobiology and Neural Adaptation	Haddad	Dr Chuck Czeisler, group of PI's at Contractors' Review, (617) 732-4013	Lt Col Byron Hepburn, Det1 33 FLTS, Charleston AFB, SC, (803) 566-5829	New knowledge about chronic fatigue	Air Force Safety Office incorporated this new data into flight safety classes for pilots

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2312C	Chronobiology and Neural Adaptation	Haddad	Dr Chuck Czeisler, group of PI's at Contractors' Review, (617) 732-4013	Lt Col Sventek, AFMOA, (202) 767-5878	New knowledge about interactions between circadian and homeostatic systems	Modification of policy/requirements for initial/recurrent physiology training for air crew
2312C	Chronobiology and Neural Adaptation	Haddad	Whole group of PI's at Contractors' Review, Bob Barlow, (315) 464-7773	Col William Berkley, AL/HRA, Mesa, AZ 85206-0904, (602) 988-6561	New knowledge about interactions between circadian and homeostatic systems	Modification of Night Vision Goggle course for aircrew
2312C	Chronobiology and Neural Adaptation	Haddad	Whole group of PI's at Contractors' Review, Dave Dinges, (215) 898-9949	Col Rod Vanderbeek, HQ AFSOC/SG, Hurlburt Field, FL 32544-5273, (850) 884-2269	New knowledge about interactions between circadian and homeostatic systems	Modification of physiological training for aircrew
2312C	Chronobiology and Neural Adaptation	Haddad	Dr Chuck Czeisler, group of PI's at Contractors' Review, (617) 732-4013	Capt Michelle Kemeny, USAFSAM/FP, Brooks AFB, TX, (210) 536-3365	Several topics discussed include sleep inertia, meatonin effects on circadian phase-shifting and napping, modafinal as potential aid	Curriculum review for entire aerospace physiology program
2312C	Chronobiology and Neural Adaptation	Haddad	Dr John Byrne, UT Medical School, Houston, TX 77030, (713) 500-5601	Dr Tobias Christen, Ciba Ltd, Basel, Switzerland, (Ph. 2.2423)	Neural network simulator	Used to analyze models of oscillators and adaptive neural circuits such as those used in advanced Avionics
2312C	Chronobiology and Neural Adaptation	Haddad	Dr John Byrne, UT Medical School, Houston, TX 77030, (713) 500-5601	Mr Glen Frick, Medical Multimedia Systems, Brooklyn, NY, (718) 934-3175, Dr Alan Gelprin, AT&T Bell Labs, Murry Hill NJ, (908) 582-5696, Joe Meehan, Nutrition Center for Toxicological Research, Jefferson, Arkansas, (516) 632-8646	Neural network simulator	Used to analyze models of oscillators and adaptive neural circuits such as those used to interpret satellite data
2312C	Chronobiology and Neural Adaptation	Haddad	Dr Jennifer Loros, Dartmouth Medical School, Hanover, NH 03755-3844, (603) 650-1108	Paul Brokaw, Nottingham Spirk, Cleveland, OH 44106, (216) 231-6275	Light and circadian regulation of fungal spores	Spin off: Used to build a home bread box with reduced mycotoxins
2312C	Chronobiology and Neural Adaptation	Haddad	Dr Benjamin Rusak, Dalhousie university, Halifax, Nova Scotia, Canada B3H 4H8 (902) 494-2159	Dr Beatrice Guardiola, Experimental Therapeutics, Servier, Courbevoie, France (Ph 331 46.41.68.09)	Neurophsiology of circadian rhythm entrainment	Melatonin analogs as natural sleep inducers with no drug aftereffect
2312C	Chronobiology and Neural Adaptation	Haddad	Dr Robert Barlow, SUNY Health Science Center, Syracuse, NY 13210, (315) 464-5253	Lt Col Chip Sitnor, 8th Fighter Squadron, Holloman AFB	Reduced visual contrast as result of combined circadian and metabolic factors	Reversing loss of visual contrast during night operations
2312D	Biomimetic Sensors	Roach	Dr Lawrence B. Wolff, Equinox Corporation, (410) 889-2541	Dr Brian H. Tsou, AFRL, (937) 255-8896	Completed feasibility demonstration of micropatemed polarization film for image processing	Advanced effort in helmut mounted displays
2313A	Sensory Systems	Roach	Dr Fred H. Previc, AFRL, DSN 240-3521	Lt Col Yauch, AFRL, DSN 240-35221	Illusory pictorial depth cues predominate over veridical motion cues and dramatically disrupt human control performance	An element to spatial disorientation simulator at Brooks AFB, TX
2313A	Sensory Systems	Roach	Dr Bryan H. Tsou, AFRL, DSN 240-3521	Capt Jeff Johnson, WL/AAZT	Successful utilization of multi-dimensional analysis to enhance target acquisition/recognition capabilities	6.4 offboard targeting for strike aircraft, Wright Laboratory, OH

Subarea	Title	PM	Performer	Customer	Result	Military Utility
2313A	Sensory Systems	Roach	Dr Martin S. Banks, University of California at Berkeley, (510) 647-9341	Dr Fred H. Previc, AFRL, DSN 240-3521	Discovered that human observers rely on extra-retinal, eye-position signals to determine heading	6.2 evaluation of pilot spatial disorientation in simulation
2313B	Perception & Cognition	Tangney	Dr Martin, AFRL/HEA, (602) 988-6561	Air Combat Command, Col Bart Barton, DSN 574-1774	Synthetic Task Environment for Uninhabited Air Vehicles	Uninhabited Air Vehicle Operator Training Device
2313B	Perception & Cognition	Tangney	Dr Kyllonen, AFRL/HEJ, (210) 536-3921	Air Force Wilford Hall, Dr Edna Fiedler, (210) 671-3487	Tests of individual personality	Screening for medical health discharge potential
2313B	Perception & Cognition	Tangney	Dr Kyllonen, AFRL/HEJ, (210) 536-3921	British Navy, Mr Chris Elshaw, 44-1252-3935-20	Tests of individual personality	AF personnel retention screening tool
2313B	Perception & Cognition	Tangney	Dr Bajaj, Purdue University, (317) 494-6531	Institute for Defense Analysis, Mr Richard White, (703) 845-2120	Software for three dimensional animation	Extension of digital battlefield simulation to include crisis management
2313B	Perception & Cognition	Tangney	Dr Hall, AFRL/HEJ, (210) 536-2872	Lockheed Corporation, Dr Walter Shiel, (817) 777-2299	Tool for cognitive task analysis	Engineering design software decision aid